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DEPARTMENT OF COMMERCE

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

E. E. PRATT, Chief

SPECIAL CONSULAR REPORTS—No. 72

BRITISH INDIA

WITH NOTES ON CEYLON, AFGHANISTAN, AND TIBET)

BY

HENRY D. BAKER

AMERICAN CONSUL AT BOMBAY

and

OTHER CONSULAR OFFICERS



WASHINGTON
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C O N T E N T S .

	Page.		Page.
Letter of submittal.....	7	Electrical plants and supplies—Con.	95
Introduction.....	9	Electric elevators in Bombay...	95
Government and political conditions.	19	Electric development in Burma.	95
Currency, banking, weights, and measures.....	22	Electric-light plants.....	96
Indian banking statistics.....	23	Water-power projects.....	100
Effect of war on Indian banking situation.....	25	Tata hydroelectric enterprise...	100
Physiography and population.....	28	Cauvery Falls.....	101
Races, religion, and social life.....	33	Water power in Patiala and Kash- mir—Minor plants.....	102
Cooperative credit movement.....	36	Possibilities of development.....	103
Education.....	40	Foreign trade statistics.....	104
Market for textbooks.....	41	Steamship routes.....	126
Education of princes and nobil- ity.....	42	Commercial travelers.....	129
School of tropical medicine.....	45	Success of commercial travelers in Karachi.....	133
Principal cities.....	47	American commercial travelers in Madras.....	133
Calcutta.....	47	Making calls.....	134
Bombay.....	48	Customs tariff.....	135
Madras.....	49	India.....	135
Karachi.....	50	Ceylon	137
Simla.....	51	Merchandise marks.....	138
Cawnpore	51	Pictorial trade-marks.....	142
Delhi.....	52	Patent applications.....	144
Lahore.....	52	Preservation of merchandise for Tropics.....	145
Other important cities.....	53	Method of purchasing Government stores.....	147
Cities in Ceylon.....	56	Governmental assistance to trade....	152
Aden.....	57	Varied activities of Indian post office.....	152
Sanitation.....	58	The value-payable postal sys- tem	153
Improvement trusts.....	61	Statistics and commercial intel- ligence.....	156
Chambers of commerce.....	67	American consular officials in India	157
Bombay.....	68	How to get business in India.....	159
Calcutta.....	68	London as a medium for American trade.....	161
Port trusts.....	70	Advertising.....	164
Financial review of ports	71	Cinematograph theaters.....	167
Railway systems.....	73	Building construction.....	169
Tramways.....	81	Building material in Bombay...	174
The street car system of Bombay.	81	Market for cement in Madras...	175
Gasoline tramways.....	81	New capital at Delhi.....	176
Equipment of India and Ceylon tramways	82	Roads and streets.....	182
Electrical plants and supplies	83	General improvements at Bom- bay	182
Use of electricity.....	85	Road construction in Burma.....	184
Imports of electrical goods.....	87		
Electric fans.....	87		
Simla as a market for electrical appliances.....	89		
Electric wiring devices in Bom- bay.....	93		

Page.	Page.		
Street lighting.....	187	Food and drink—Continued.	
Fire-fighting services and equipment.....	189	Market for hams and bacons	267
Cotton fires in Bombay.....	189	The liquor trade.....	268
Appliances in Kolar gold mines.....	189	Beer drinking in India.....	269
Motor fire engines.....	190	Market for American mineral waters.....	270
Motor vehicles and bicycles.....	191	Manufacture of aerated waters...	270
Automobiles in India.....	191	Toilet preparations and laundries...	276
Motor vehicles in south India.....	193	Soap trade in India.....	281
American cars in Madras.....	197	Barber shops and supplies.....	283
American automobiles in Burma.....	199	Drugs and chemicals.....	286
Motor trucks.....	199	Vegetable indigo.....	287
Motor busses and trucks in Cal- cutta	203	Use of vermillion pigment.....	288
Bicycles in Madras.....	204	Antidote for snake bite.....	288
Iron and steel goods.....	205	Hides, skins, and leather goods	290
Trade in iron and steel.....	205	Tanning materials	293
Growing demand for machinery.....	209	Leather manufactures	294
Sewing machines.....	211	Boots and shoes	295
Steel pipes and sheet piling.....	212	Leather purses	296
Hardware lines.....	215	Miscellaneous imports	297
Iron buckets and bathtubs.....	221	Musical instruments	297
Domestic utensils.....	224	Glassware	299
Metal lamps.....	225	Toys and sporting goods	301
Metal safes for south India.....	225	Folding boats	304
Metal bedsteads.....	226	Explosives	305
Gas cooking stoves in Bombay.....	229	Matches	305
Monsoon drying stoves.....	230	Combs	306
Packing cooking stoves.....	230	Candles	307
Bird cages.....	231	Christmas retail trade	308
Electroplated silverware.....	232	Optical goods	311
Aluminum industry.....	234	Stationery trade	312
Textile manufactures.....	235	Pencils and pens	312
Cotton manufacturing industry.....	235	Christmas cards	313
Cotton piece goods.....	243	Printing-office supplies	314
Calcutta's imports of cotton goods	243	Typewriters and carbon paper..	315
Tents and camp furniture.....	244	Market for glue	317
Silk industry of Salvation Army.....	248	Principal crops	318
Silk growing and manufacturing in Burma.....	249	Jute	318
Manufacture of carpets.....	250	Wheat	319
Knit goods in Madras.....	253	Rice	320
Afridi wax cloth.....	253	Sugar	324
Woolen goods.....	254	Cotton	326
Remnants and cut pieces.....	257	Tobacco	328
Blanket trade in Burma.....	258	Tea and coffee	329
Apparel.....	259	Important oilseed crops	330
Shirt and collar trade.....	259	Millet and pulse	332
Corset trade.....	261	Opium	333
Hosiery trade.....	263	Rubber	333
Umbrellas and waterproof goods..	263	Groundnuts	334
Food and drink.....	266	Acreage of crops, 1914–15	334
Pure food goods.....	266	Market for American seeds	335
Trade in Indian condiments....	266	Farm-implement trade	336
		Farm-implement depots	336
		Agricultural implements in the Punjab	341

Page.	Page.
Farm implement trade—continued.	
Plows in southern India.....	347
Agricultural implements in western India.....	349
Steam thrashing.....	351
Grain elevators and drying plants.....	
Spraying machines.....	352
Irrigation	354
Tube wells for irrigation	359
Well-boring machines in Hyderabad.....	362
Exhibition in Bombay.....	362
Pumps for irrigation.....	363
Windmills.....	366
Oil engines.....	368
Labor-saving machinery.....	369
Wells for irrigation in South India.....	369
Dairy products	370
Butter making.....	370
Military dairy farms.....	372
Canned-milk advertising.....	373
Burma's trade in condensed milk	374
Vegetable oils	376
Production and uses of cotton-seed	380
India possible market for American can cottonseed oil.....	384
Cottonseed-oil industry in Mysore.....	388
Coconut palm and products	390
Fruit and nuts	393
Citrus fruits	393
Fruit trade of Baluchistan	393
Canning mangoes	396
Bananas	396
Cashew-nut industry	397
Forestry and forest products	399
Export trade in teak	400
Burma's production and exports of teak	401
Sandalwood	402
Development of forestry in South India	403
The cultivation of lac	404
Production of lac and cutch in Burma.....	405
Turpentine and rosin	405
The mahua or mowra tree	406
Demand for portable timber-felling machines	407
Pacific coast timber for railways	407
American shooks in Burma.....	408
The fisheries	409
Salmon and cod imports	409
Sardine-oil and guano industries	411
Pearl fisheries of the Bahrein Islands	412
Mines and minerals	413
The Kolar gold fields	413
Manganese	415
Mica	415
Copper, tungsten, corundum, radium, and uranium	416
Precious stones	417
Coal	417
Petroleum	420
Glass manufacture	424
Ivory and elephants	426
Egret farming	428
Important Native States	430
Mysore	430
Bhopal	434
Baroda	436
Hyderabad	442
Gwalior	448
Kashmir	455
Benares	468
Kapurthala	473
Baluchistan	474
French and Portuguese India	483
Pondicherry	483
Portuguese India—Goa	487
The Andaman Islands	489
Effect of war on trade conditions	490
Decided falling off in trade during 1914	490
The war and our trade with India	492
The war and opportunities in India	496
Government aid to banks and cotton trade	499
Notes on northwest India	500
Effect of war on Indian trade	501
Latest consular trade reviews	504
Calcutta	504
Bombay	509
Madras	514
Rangoon	520
Karachi	529
Afghanistan	533
Commerce and trade routes	533
Construction works	544
Imported fashions and articles of trade	548
Sheep and wool industry	555
Agricultural and mineral resources	556
Medical and surgical treatment, child mortality, etc	558
Tibet	561

CEYLON.	Page.	Page.	
Automobiles.....	574	Commerce and industries.....	601
Progress in motor-car trade.....	574	Declared exports to United States.....	611
Demand for motor trucks.....	582	Method of buying Government supplies.....	611
American oils.....	588	Market for American merchandise.....	613
Market for fresh fruits.....	589	American wheels for rickshaws.....	620
Market for playing cards.....	590	Machinery and hardware.....	622
Tea cultivation.....	590	Printing paper and machinery.....	627
Uses of cardamoms.....	594	Cinematograph theaters.....	628
Production and uses of papain.....	595	Mining in Ceylon.....	628
Rubber trade.....	596	Plumbago.....	628
Rubber-collecting carts and tools.....	597	Precious stones.....	631
New rubber coagulant.....	599	Improved sanitation.....	622
Coconut products.....	599	Cooperative credit societies.....	633
Coir fiber and yarn.....	600	The Maldivian Islands.....	634
		Index	635

ILLUSTRATIONS.

FIG. 1. Share of principal foreign countries in export trade of India.....	11
2. Share of principal foreign countries in import trade of India.....	12
3. Reinforced concrete "chawls" or tenements erected by Bombay Improvement Trust.....	facing 64
4. Hand loom devised by American missionary.....	facing 65
5. Tramway tip truck.....	84
6. Site of the new capital of India.....	179
7. Box for tropical helmet.....	218
8. The "Bombay" jewelry box.....	218
9. Lady's hat box.....	219
10. Army air-tight boot box.....	219
11. Lavatory for upcountry houses.....	222
12. Office dispatch box.....	226
13. Monsoon drying stove.....	230
14. Advertisement of American underwear in Bombay newspapers.....	260
15. Convoluted-tube well.....	359
16. Section of convoluted-tube well.....	360
17. Winnowing wheat, Baluchistan.....	facing 478
18. Cotton goods at Quetta, Baluchistan.....	facing 478
19. Fruit packed for transport by camel or donkey, Afghanistan.....	facing 479
20. The "pousse-pousse," a curious push carriage at Pondicherry, French India.....	facing 479
21. Exit of Khyber Pass into Peshawar Plains.....	facing 542
22. Fruit stall in Quetta ingle fruit market, Baluchistan.....	facing 543
23. Factory scene showing tea breaker and sifting machine.....	facing 593
24. Rubber-latex collecting cart, Ceylon.....	598
25. Knives for making incisions in rubber trees, and cup, with supports, for gathering latex.....	598
Map of India	facing

LETTER OF SUBMITTAL.

**DEPARTMENT OF COMMERCE,
BUREAU OF FOREIGN AND DOMESTIC COMMERCE,
Washington, June 15, 1915.**

SIR: I have the honor to submit herewith a handbook of India. This deals with industrial and commercial features of British India, Ceylon, Afghanistan, and Tibet, and is one of a series of such publications which the Bureau is issuing, previous monographs having treated Australia, New Zealand, Canada, South America, and Russia. A handbook on Central America is in course of preparation.

In order that American business men may enter foreign trade preparedly, it is highly advisable that each field be studied, not simply in one or two phases, but in all its aspects. In this monograph on India an attempt is made, therefore, to present comprehensively the facts that should be known by Americans entering the markets there. The value of American products consumed annually in India is less than 4 cents per capita. It is not anticipated that our trade there can be increased to \$10 per capita, which is the rate of our sales in Australia, but a very small per capita increase in the consumption of American merchandise by the 315,000,000 people of India would add considerably to our exports.

A special study of the field was therefore deemed very important. By arrangement between the Department of Commerce and the Department of State, Consul Henry D. Baker was detailed to make the investigations. In his travels, during a period of about one year, he covered the island of Ceylon and most of British India, up to the borders of Afghanistan and Tibet, including Baluchistan. His special reports, many of which were published in Daily Consular and Trade Reports, furnished the principal material for this monograph. The various consular officers in India and Ceylon, acting under special instructions, also made contributions, of which appreciation is expressed herewith. The editorial work was performed in the consular division of this Bureau and included the collation, by research, of much valuable information. While in Washington, prior to his departure for his new post, Mr. Baker, now Commercial Attaché at Petrograd, made further revision of his reports. A map of India and some pictures, taken and collected by Mr. Baker, are inserted.

LETTER OF SUBMITTAL.

It is hoped that this handbook will enable American manufacturers and exporters to obtain a comprehensive idea of the commercial features of India and countries contiguous to it, and thus appropriately and intelligently to make larger use of opportunities for increased trade.

Respectfully,

E. E. PRATT, *Chief of Bureau.*

To Hon. WILLIAM C. REDFIELD,

Secretary of Commerce.

BRITISH INDIA.

**Its Resources, Industries, and Trade, with Suggestions as to Its Development as
a Market for American Merchandise.**

INTRODUCTION.

The Empire of British India is one of the few large countries of the world where there is an "open door" for the trade of all countries. There are no discriminating tariff duties against products of the United States or other countries, such comparatively small tariff duties as are levied being for revenue purposes only. Although British India is under the control of the British Government, commercially it is a country of equal opportunity for all the nations of the world. Although it is unquestionably the most valuable commercial asset of the British people, a feature of British policy in promoting India's well-being has been to allow all countries the same advantages of trade that are possessed by the United Kingdom itself. Trade opportunities are freer to American firms in British India than they are in such self-governing British countries as Canada, Australia, and New Zealand, which in their tariffs give special trade preferences to the mother country.

During the official year 1913-14 British India purchased from the United Kingdom goods to the value of \$381,475,000; from the rest of the British Empire goods to the value of \$34,012,000; from Germany, \$41,093,000; from the United States, \$15,544,000; from Japan, \$15,510,000; from Austria-Hungary, \$13,918,000; from Belgium, \$13,816,000; and from France, \$8,730,000. The total of all imports into British India for this year (1913-14) amounted to \$594,521,000. It is thus evident that the United States gets only a small proportion of India's import trade, and not one-half what Germany had previous to the war, Germany having ranked second to the United Kingdom in supplying goods to British India.

In 1913-14 the United States controlled only 2.6 per cent of the trade of British India, while Germany controlled 6.9 per cent and the United Kingdom 64.1 per cent. During the last decade both the United States and Germany almost doubled their percentages of share in this trade, while the United Kingdom fell off slightly (1.1 per cent). Although it is hardly to be expected that the United States could ever bring its figures of export trade with India up to anywhere near the

10 RESOURCES, INDUSTRIES, AND TRADE OF BRITISH INDIA.

magnitude of those of the United Kingdom, there would seem to be no good reason why India should not buy at least as largely from the United States as it has done from Germany. The only reason why the United States has fallen behind Germany in the competition for trade with India is that American manufacturers have shown apathy and ignorance of conditions in India and have failed to make the concessions necessary to gain trade; whereas German manufacturers have gone to considerable trouble to keep themselves well informed as to Indian conditions and have shown enterprise and perseverance in their campaign for trade, and, either by lowering prices or by giving credit, have made the necessary concessions and so secured increases in business. The diagrams on pages 11 and 12 illustrate the relative share of different countries in the foreign trade of India during 1913-14 as compared with the previous decade.

IMPORTS FROM FOREIGN COUNTRIES THROUGH UNITED KINGDOM.

Concerning the trade of British India with the United Kingdom, it may be explained that undoubtedly a considerable proportion of that trade may include goods from other countries which the United Kingdom imports and then exports to India. It is certain that the United States does indirectly through the United Kingdom a large business which does not show in the exports of its direct trade with India. As long as American manufacturers can do a fair business with India through England, the fact that such trade is statistically not credited to the United States is of no practical consequence. In a later chapter in this book on "London as a medium for American trade with India" (p. 161) will be found a serious suggestion that American manufacturers, in case they are not able to make direct trade concessions with India, take advantage of the splendid export organizations in London, either by selling goods to such organizations for reexport to India or by working the business with them on a commission basis. Even if due consideration be given the large indirect business the United States does with India through England, an examination of the articles on sale in Indian bazaars will show that American goods, outside of kerosene oil, sewing machines, typewriters, tobacco goods, several well-known lines of cotton piece goods, and a few articles of hardware, are not sold in nearly the same volume and value as the goods of the United Kingdom and Germany.

In the investigations concerning the Indian market it was found that the masses of the people had no sentimental preferences for or against goods of any particular country. Generally speaking, price conditions, not sentiment, were the predominating factors of trade. It is true that a few British firms in India are prejudiced in favor of British goods, but in the strenuous competition of the Indian market

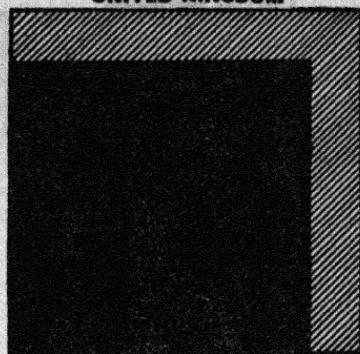
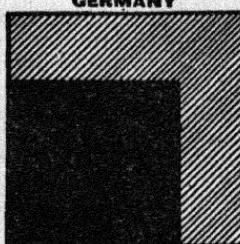
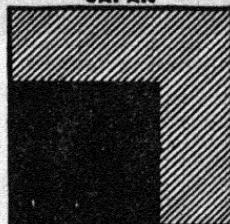
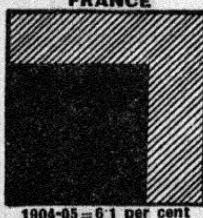
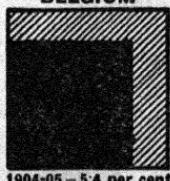
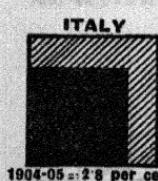
UNITED KINGDOM**GERMANY****JAPAN****UNITED STATES****FRANCE****BELGIUM****AUSTRIA-HUNGARY****CEYLON****HONGKONG****STRAITS SETTLEMENTS****CHINA**

FIG. 1.—Share of principal foreign countries in export trade of India.

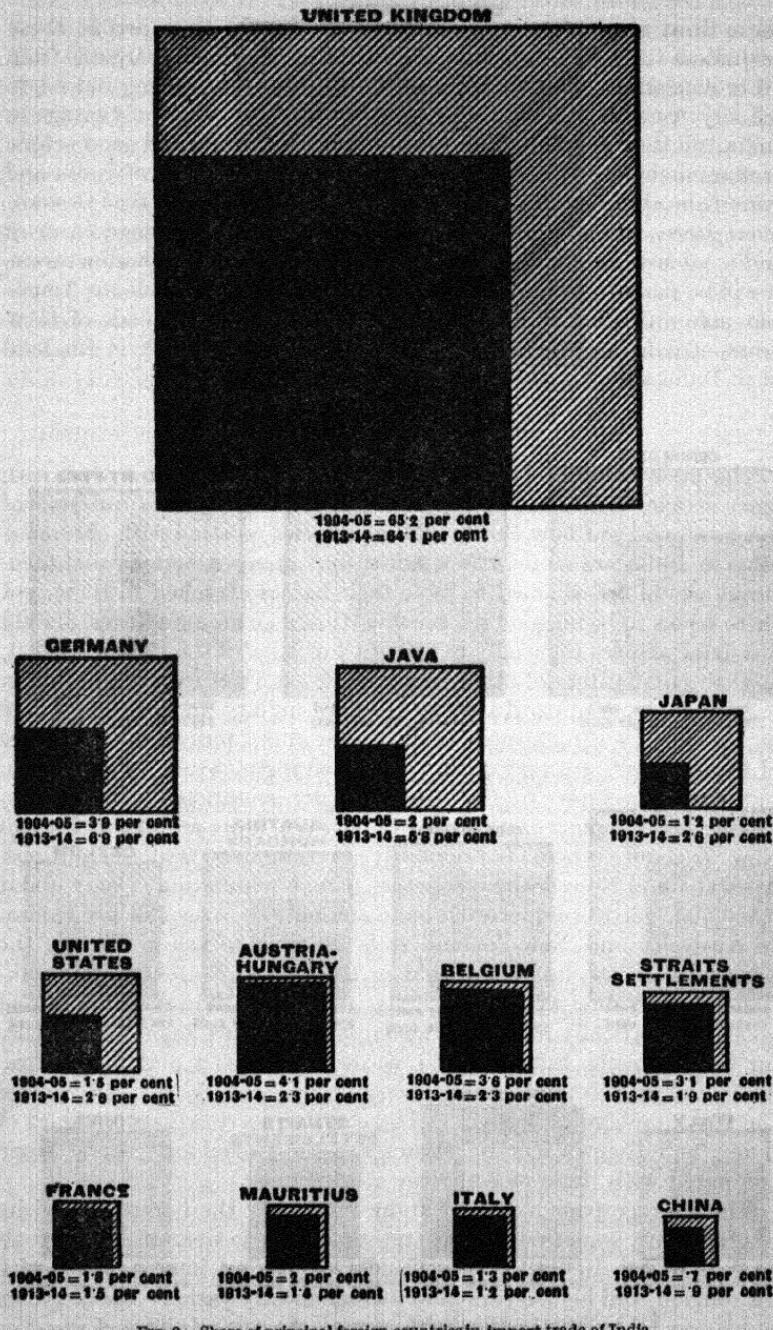


FIG. 2.—Share of principal foreign countries in import trade of India.

these firms would lose considerable trade should they permit these prejudices to stand in the way of their offering suitable bargains from other countries. British firms are frequently very willing indeed to sell any American merchandise that can be sold to real advantage in India; all they require is a chance for quick turnovers and good profits or commissions. While it is true that the Government of India and various local governments have strict rules to the effect that Government stores must be purchased either in the United Kingdom or in India, such rules giving a great advantage to British manufacturers, it will be shown subsequently in this book that it is possible for American manufacturers to have their goods requested by heads of Government departments in India and then purchased either in England or in India where dealers may have them in stock.

WHAT THE MASSES BUY.

The main thing to be considered about Indian trade is that with most articles purchased by the masses of people it is a question of not how good but how cheap. Many articles meeting with enormous sales in India are so poor in quality that many American manufacturers would be ashamed to have their names attached to them, yet there seems to be no good reason why American manufacturers should not make articles especially to suit the low level of the Indian market, as their competitors of other countries do, and not expect the Indian market to come up to American levels of quality and prices. There are about 315,000,000 persons in India whose individual purchases of foreign goods are very small indeed, averaging \$1.91 per year each, but their purchases in the aggregate are enormous. There is an interesting difference in this respect between India and Australia and New Zealand, where I previously investigated trade conditions. Australia and New Zealand together have a population of only about 5,500,000, yet the imports amount annually to over \$80 per capita. In Australia and New Zealand it is possible to sell practically the same kind of articles as are sold in the United States, where conditions of individual wealth are similar. In India, however, the sale of goods is practically limited to a comparatively few high-class articles for Governments, railways, and wealthy European and native residents and an enormous mass of very cheap goods within the reach of the vast numbers of natives. These latter have a low standard of living, and their wages or earnings seem ridiculously small when compared with those of American workingmen.

The average poor native of India buys only the barest necessities of life, chiefly something to eat and something to wear and a few tools to work with. In his diet he is usually vegetarian, in accordance with his religion, and his food supplies include mostly various cereals grown in his own country, together with sugar. In this one item of sugar so

enormous is the consumption in the aggregate that notwithstanding the country itself produces about 2,500,000 tons of sugar annually, or more than any other country in the world, about \$40,000,000 worth of sugar has also to be imported annually; this is chiefly cane sugar from Java and Mauritius and beet sugar from Austria-Hungary, over 600,000 tons coming annually to supplement the local production. He also buys for his food when he can afford it dairy products such as ghee or clarified butter, for which American cottonseed oil might perhaps be substituted, as suggested later in this book. His clothing consists chiefly of cotton cloth wound loosely around his body and over his head, and yet such apparently insignificant values as are included in his apparel and coverings represent in cotton manufactured goods imported from the United Kingdom alone an aggregate of over \$220,000,000 a year. His necessities or special luxuries also include such articles as paper, cutlery and hardware, imported matches for lighting his locally made or imported cheap cigarettes, glassware, cooking utensils, and various kinds of receptacles of copper, iron, and aluminum for carrying water, foods, etc. As his standards of living and working rise somewhat, he becomes a good customer for cheap soaps, shoes, watches, clocks, and a multitude of other inexpensive odds and ends.

EXTENT OF MARKET FOR HIGH-CLASS GOODS.

There are, however, perhaps nearly 1,000,000 people in the Empire whose standards of living are substantially higher than those of the poor natives mentioned. Among these can be included the European and American population, consisting of merchants, missionaries, persons connected with civil administration, and the officers and soldiers of the British Army; Indian princes and nobility and large landowners and merchants; the Parsi community, mostly in Bombay, which is reasonably well-to-do; and the Eurasian or Anglo-Indian element, partly European and partly Asiatic by blood, which is largely employed in offices and on railways. Such persons are all patrons of department stores and shops where substantially the same qualities of goods are sold as in Europe and America. Many have motor cars and other articles which can only be bought by those with reasonably good incomes. These persons make up an important though limited market for high-class goods, but of course their numbers are insignificant in proportion to the great masses of the Indian population. Unfortunately such comparatively few persons are all that most American manufacturers have thus far catered to, except in kerosene, sewing machines, and tobacco goods. The Government of India and various local governments, railways, factories, building contractors, and engineering firms also offer a very important market

for the sale of iron and steel goods, typewriters, machinery, and tools of various sorts.

Private incomes in India vary greatly, from those of many wage-earners who do not make even 5 cents a day up to that of His Highness the Nizam of Hyderabad, who is said to have a personal income of about \$2,500,000 a year. English Government and military officials and business employees draw higher salaries for the same rank or grade of work than they would in England, but native clerks, mechanics, etc., draw considerably less pay than those of corresponding positions in England and America.

Sometimes American manufacturers, finding it reasonably easy to do a certain amount of business in India, wonder why it is that their sales can not gain considerable magnitude in view of the enormous population of the country. The reason often is that the market for which their particular line of goods is suitable is limited, the articles being far beyond the purchasing ability of the great masses of the country.

If American sales in India are to become comparable in volume and value with those of the United Kingdom and of Germany, American manufacturers must arrange to sell goods suitable not only for the comparatively small upper and middle classes, but goods cheap enough and simple enough to be within the reach of over 300,000,000 people who belong to the poor and illiterate classes of society. In doing business with the upper and middle classes it is possible to secure a rather wide margin of profit, but the sales must be comparatively small. In doing business with the great masses of the people the margin of profit must be extremely small; however, the sales and the collective profits may be enormous.

DIFFICULTIES OF THE INDIAN MARKET.

Although there seems more or less desire among American manufacturers to make advantageous trade connections with India, and a similar desire is often noticed among business houses in India to get into business touch with firms in the United States, there are often practical difficulties in the way which would take time, patience, and careful study to overcome. Proper understandings between international buyers and sellers can not be easily arrived at by use of mails and cables. In most cases personal interviews and actual opportunities of examining samples are necessary to business. Frequently it will be found that a merchant in India, who has been recommended perhaps by an American consul to an American firm as being just the right kind of representative for his line of goods, has already committed himself to the interest of some other manufacturer in the same line, possibly an English or German firm; the local agent may have so many agencies that he can not represent any of them prop-

erly, or mutual misunderstandings occur which defeat business. Possibly the American manufacturer wishes to sell his goods only for cash in New York, and wants the local firm in India to figure out what the freight and other charges will be. Possibly also the American manufacturer, if his efforts in the Indian market meet with some slight response, immediately has an extravagant idea of the business in sight, and sometimes either overcharges or refuses to do business at all unless he gets a contract to sell a certain definite amount of goods each year. This results usually in the Indian merchant being unwilling to give any order at all, since he dislikes to take too much financial risk in experimenting with a new article. American firms seldom give Indian firms any credit, even when the latter are known to be entirely reliable, and expect them to carry their stock without assistance and if they advertise to do so at their own expense. Many of the practical difficulties of the Indian market, however, could be overcome if American firms had direct selling agencies in that country. The particular problems could then be more intelligently handled and effectively dealt with.

If American manufacturers take up export trade in India they should do so not merely to take advantage of temporary opportunities as afforded by the war, but with the idea of persistently cultivating and expanding their business there irrespective of whether or not the home market may temporarily afford more profit. There is nothing more exasperating to Indian firms than to be suddenly disappointed by American firms who sometimes seem to like to get in and out of this India market as a speculator would get in and out of the stock market. Generally speaking, the initial trouble and expense of working up a satisfactory business in India is very great, more so perhaps than in most other countries, but once the business is well established and trade-marks well known it requires comparatively little effort and expense to hold the business and perhaps expand it.

THE VALUE OF ADVERTISING.

It is characteristic of the market in India that local merchants there make comparatively little effort to promote the sale of their goods. They expect that to be done for them by the manufacturer, and if the manufacturer does not do it they are likely soon to lose interest in his goods. Most commercial travelers in India notice that it is not so difficult to secure moderate orders when they make their first visit, as long as price conditions are not too difficult; but when they make their second visit they find it very hard to get the orders repeated, unless, in the meantime, some effort has been made to create a demand by advertising, and if no advertising has been done a lot of unsold goods purchased at the time of the previous visit

will be pointed out as a reason why it is unnecessary to renew the order.

For cheap goods suitable for sale among the great masses of the people pictorial advertising has exceptional value. It is said that in Japan all except about 5 per cent of adult people can read or write, but in India it is doubtful if 5 per cent can either read or write. The people in India can, however, understand what a picture means, especially when frequently used as a symbol or trade-mark for an article with which they are familiar. Goods intended for popular sale ought then to be labeled or marked with some distinctive pictures which could be easily remembered. For instance, cotton piece goods are distinguished by labels in which Indian deities, tigers or other animals, dancing girls, etc., are displayed in attractive colors. Thus, of two different brands of American kerosene mostly known in India one is called the Elephant brand and the other the Monkey brand.

AIM OF THIS HANDBOOK.

In writing reports concerning India, the author has been actuated by a desire to give definite information concerning many specific lines of goods sold in that country, or capable of being sold, rather than to discuss unduly general economic conditions, no matter how interesting. It has been observed that American manufacturers like particular information concerning the markets for the particular goods they manufacture, rather than academic discussions of conditions in general. In this handbook will be found reports concerning a great variety of special articles of merchandise suitable for the Indian market. Considerable general information, however, which affects all manufacturers who wish to do business in India, is also embodied in the book, as, for instance, discussion of the merchandise marks act of the country, ignorance of which often places American manufacturers in an embarrassing position.

During his travels through Ceylon and India, and his residence in Bombay, as American consul, the author received many courtesies from fellow consular officers and from Government officials and merchants, which gave great assistance in the preparation of these reports. The Government of India kindly instructed all heads of Government departments and all British Residents in Native States to render every assistance possible. Some of the leading native sovereigns in India showed particularly friendly interest in the work. Acknowledgement is also made for the valuable assistance rendered by Mr. Alfred Chatterton, Director of Industries and Commerce of the Mysore Government, and to the late Mr. F. Noel Paton, Director of Commercial Intelligence of the India Government. Credit is also given to the book "The Empire of India," by Sir J. Bampfylde Fuller, from which much material relating to the physiography of India was taken.

TERRITORY COVERED.

This handbook treats not only of British India proper, but of Ceylon, Afghanistan, and Tibet. Among these neighboring countries Ceylon affords a relatively better market, in proportion to its population, for imported merchandise, than does British India. While trade with Afghanistan and Tibet is not very large, nor the possibilities very promising, as these countries have hitherto been commercially almost unexplored and never previously discussed in any American consular reports, it was thought it would be of interest to tell as much as possible about them. Within India itself are a number of important States, which are almost self-governing and are very interesting in many ways. Some of these are specially written up in this book, in order to suggest what the interior of India is really like. Many Americans are apt to think of India as a whole, not realizing that it includes groups of Provinces and States that are practically important nations by themselves, although all consolidated to some extent by loyalty to the British Crown. These States used to be constantly at war with each other, but now, while they are practically independent, they are obliged by British rule to keep the peace as regards their relations with each other, and no oppression is tolerated.

GOVERNMENT AND POLITICAL CONDITIONS.

The area of India is a little more than half that of the United States, and includes a grand total of 1,802,192 square miles, of which 1,093,074 square miles is under direct British rule, and 709,118 square miles is comprised in Native States which are autonomous as regards their government except that the British Government exercises a certain amount of supervisory control over them through political officers or "Residents" who reside at their respective seats of government. No Native State is allowed to have correspondence or other diplomatic or political relations with foreign countries except through the medium of the British Government. There are nearly 900 Native States in India, some of considerable size, like Hyderabad, Kashmir, Mysore, Gwalior, and Baroda, the five largest, while many comprise only petty areas. These Native States as a rule have customhouses on their borders, collecting duties on imported goods in addition to the duties collected by the Government of India at the various seaport towns. Some of them even have their own post-office systems, but these systems relate only to internal mail service, and the Government of India post-office system has to be used for correspondence with other parts of India and countries outside of India. Some of the States, like Hyderabad, also have their own mints for coinage of money, but such currency as they make has only local circulation, while India rupees circulate throughout India, even in States which have their own mints.

The King of Great Britain and Ireland is known as the Emperor of India. In the British Cabinet at London is the Secretary of State for India, who is at the head of a council which has general charge of Indian affairs. In India itself, the authority of the Emperor is delegated to a Governor General, or Viceroy, assisted by a council. Subject to general control by the Secretary of State for India at London, the Government of the Viceroy has supreme control over the general affairs of the Empire of India. The work of this Government is distributed among the departments of Finance, Commerce, Home and Foreign Affairs, Revenue and Agriculture, Army Regulation, Education, and Public Works. The headquarters of this Government is at Delhi in the winter and at Simla in the summer. The former capital was Calcutta, the change having been effected in 1912. At present the capital buildings at Delhi are only of a temporary nature, but elaborate preparations are now being made, as described further in this book, for magnificent and costly structures. Most of the Government work is still being done at Simla during the entire year. Simla is also the military headquarters of British rule in India. Calcutta still contains one important bureau of Indian Government work, the Department of Commercial Intelligence, which offers very useful facilities for acquiring business information concerning India.

PROVINCES AND NATIVE STATES.

The portions of India which are under direct British rule include 15 different Provinces, of which two, Bombay and Madras, are known as Presidencies. These Provinces have governors appointed by the British Crown, assisted by councils, the same as the Government of India. While the Government of India has control of the customs, post offices, and telegraphs, the financial system of the Empire, and owns some of the leading railways and regulates others, and also determines the general policies for the well-being of the inhabitants, the great majority of administrative details, including the assessment and collection of revenues, local public works, etc., are carried on by these provincial governments. All these Provinces are divided into districts, the heads of which are known as "collectors" or "chief magistrates," who have highly important administrative and judicial powers.

The map of India, in the back of this book, shows that a great portion of the interior of India is composed of Native States while the coast is almost entirely covered by British Provinces. The statistics of sea-borne trade, therefore, which furnish the statistical substance of this handbook, cover practically all the trade by sea which reaches the Native States of the interior, as well as the British Provinces. The leading Provinces, States, and Agencies of India are as follows:

Principal divisions.	Area.	Popula-tion.	Principal divisions.	Area.	Popula-tion.
PROVINCES.					
Ajmer-Merwara.....	2,711	501,395	States and Agencies.		
Andamans and Nicobars.....	3,143	26,459	Assam State (Manipur).....	8,456	346,222
Assam.....	53,015	6,713,635	Baluchistan States.....	80,410	396,432
Baluchistan.....	54,228	414,412	Baroda State.....	8,182	2,032,798
Bengal.....	78,699	45,483,077	Bengal States.....	5,393	822,565
Bihar and Orissa.....	83,181	34,490,084	Bihar and Orissa States.....	28,648	3,945,209
Bombay.....	123,059	19,672,642	Bombay States.....	63,894	7,411,675
Burma.....	230,839	12,115,217	Central India Agency.....	77,367	9,356,980
Central Provinces and Berar.....	99,823	13,916,308	Central Provinces States.....	31,174	2,117,002
Coorg.....	1,582	174,976	Hyderabad State.....	82,698	13,374,676
Madras.....	1,142,330	41,405,404	Kashmir State.....	84,432	3,158,126
Northwest Frontier Province.....	13,418	2,196,933	Madras States.....	10,084	4,811,841
Punjab (including Delhi).....	99,779	19,974,956	Mysore State.....	29,475	5,806,193
United Provinces of Agra and Oudh.....	107,267	47,182,044	Northwest Frontier Provinces, Agencies, etc.....	25,500	1,622,094
Total, British territory.....	1,093,074	244,267,542	Punjab States.....	36,551	4,212,794
			Rajputana Agency.....	128,987	10,530,432
			Sikkin.....	2,818	87,920
			United Provinces States.....	5,079	832,036
			Total, Native States.....	709,118	70,864,995
			Grand total.....	1,802,192	315,132,537

NOTE.—The population figures given above are from the census of 1911.

The largest Native State in population is Hyderabad in south central India, whose ruler, the wealthiest and most powerful native sovereign of India, is known as the Nizam. The Rajputana Agency in northwestern India is the largest in area of the native districts, but in Rajputana are included 21 Native States surrounding the British Province of Ajmer-Merwara. The second largest in area is the famous Kashmir State in the mountains of the extreme northwest. Among others are the progressive States of Mysore in the south, Baroda just north of Bombay, and Gwalior in central India. The rulers of all

the large Native States except Hyderabad are known as maharajas. Some of the smaller States have rulers known as rajas, if Hindu States, and nabobs, if Mohammedan States. The important Native State of Bhopal has a Mohammedan woman ruler, who is known as the begum, which is the feminine of nabob, or nawab. The feminine of raja is rani, and of maharaja, maharani. The usual title of the prime minister of a Native State is dewan.

Between the Northwest Frontier Province and the Afghanistan border lies the turbulent tribal territory, over which the British Government exercises a minimum of interference. Familiar names in recent warfare in this region are Khyber, Swat, and Chitral. Sikkim, a British protectorate since 1890, borders on the Himalayas and Tibet, lying between the two independent States of Nepal and Bhutan. Other Native States are named as the British Provinces, to which they are in a sense tributary, as those of Bengal, Bombay, Madras, the Punjab, and Assam. In the northeastern Himalayas, separating British India from Tibet, are the large States of Nepal and Bhutan, which are practically independent, although submitting to a certain friendly advisory control from the Government of India. A fairly large frontier trade is carried on with these two States and Tibet.

CEYLON NOT PART OF BRITISH INDIA.

Ceylon is often referred to as if it were a part of British India, but it is a Crown colony by itself with an entirely separate administration and system of custom duties, posts, telegraphs, etc. Burma, on the other hand, is often considered as separate from British India. Although Burma is reached by sea routes from the rest of India, politically it is under the same administration. Aden, in Arabia, is under the administration of the Indian Government, and is politically a part of the Bombay Presidency. The Andaman and Nicobar Islands, in the Bay of Bengal, are under the Government of India as a separate Province. Baluchistan is under the control of an agent of the Governor General of India.

On the Indian Peninsula are left two remnants of the former large Asiatic colonial powers of France and of Portugal. One is the French colony of Pondicherry on the southeast coast and several small French settlements farther up the coast. The other is the Portuguese colony of Goa on the southwest coast.

CURRENCY, BANKING, WEIGHTS, AND MEASURES.

The currency of India is based upon the rupee, a silver coin. In order to provide a remedy for the heavy loss caused when gold payments were to be made in England and to relieve foreign trade and finance from the inconvenience of a fluctuating exchange, it was resolved in 1893 to fix definitely the value of the rupee at its present rate of 1s. 4d. by introducing a gold standard at the rate of 15 rupees = £1 sterling.

The American equivalents of Indian money are as follows: Rupee = 16 annas = \$0.3244 $\frac{1}{2}$; anna = 12 pies; 15 rupees are equivalent to £1. The sum of 100,000 rupees is called a lakh and of 10,000,000 rupees a crore.

No banks are allowed to issue currency notes. They are issued only by the Government, which was authorized by the act of 1893 to issue notes in exchange for gold coin or bullion to any amount. By the act of 1910 a note of the value of 5, 10, or 50 rupees was declared to be a legal tender throughout British India. In 1911 another note of the value of 100 rupees was also declared to be a "universal currency note." The Department of Paper Currency is empowered to issue without any limits promissory notes called currency notes, payable to the bearer on demand, in denominations of 5, 10, 50, 100, 500, 1,000, and 10,000 rupees, the issue being made in exchange for rupees, half rupees, gold coin, or gold bullion.

When the European war broke out it became apparent that gold was being withdrawn from the reserve for purposes of speculation. Sovereigns were at a premium and were taken from the currency reserve and sold at a profit. The Government, therefore, declined to issue sovereigns in sums smaller than 10,000 rupees at a time. As the speculators then clubbed together and formed syndicates to withdraw sovereigns, an absolute embargo was placed on the issue of gold.

PRINCIPAL BANKS—THE "SHROFF."

Among the principal banks in India are the Bank of Bengal, Bank of Madras, Bank of Bombay, Chartered Bank of India, Australia and China, Comptoir National d'Escompte de Paris, Delhi and London Bank (Ltd.), Eastern Bank (Ltd.), Hongkong and Shanghai Banking Corporation, International Banking Corporation, Alliance Bank of Simla, Mercantile Bank of India (Ltd.), National Bank of India, Russo-Asiatic Bank, and Yokohoma Specie Bank.

The latter part of 1913 witnessed a serious banking crisis in India; about 18 banks under native management failed in different parts of the country. None of the European banks were affected.

An important factor in Indian banking is the "shroff," who acts as an intermediary between the trading community and the banks. This may be illustrated in the following manner: A shopkeeper in the bazaar, with limited means, finds that, after using all his own money, he requires, say, 25,000 rupees to stock his shop suitably. He approaches the "shroff," who, after careful inquiries as to the shopkeeper's position, grants the accommodation, if satisfied that the

business is safe. The demands on the "shroffs" are often greater than they are able to meet out of their own money, and it is at this point that the assistance of the banks is called into requisition. The "shroffs" do this by taking bills which they already hold to the banks for discount under their indorsement, such bills being accepted to an extent determined by the standing of the "shroff" and the strength of the drawers. Past experience has shown that this class of business is one of the safest the banks engage in.

INDIAN BANKING STATISTICS.

[Indian (Government) Trade Journal, Mar. 18, 1915.]

There has just been issued by the Department of Statistics an interesting bluebook entitled "Statistical Tables Relating to Banks in India." The introduction says:

The object of the statistical tables appended to this memorandum is to show in detail the latest available statistics relating to banking and the results of a statistical inquiry into bank failures in India in 1913 and 1914.

The statistics relating to the working of the banks have been furnished direct by the banks in India, except in the case of the exchange banks, the returns of which, as in previous years, have been obtained through the British Secretary of State for India. The statistics relating to bank failures in each Province have been obtained from local authorities.

GENERAL CHARACTER OF INDIAN BANKS.

Banks in India may be classified into (1) Presidency banks, i. e., the Bank of Bengal, the Bank of Bombay, and the Bank of Madras; (2) the European exchange banks, whose head offices are located outside India; these exchange banks may be subdivided into two classes, viz, those which do a considerable portion of their business in India such as the National Bank of India (1863), the Chartered Bank of India, Australia, and China (1853), and several others; those banks which are merely agencies of large banking corporations doing business all over Asia, such as the International Banking Corporation, the Russo-Asiatic Bank, the Yokohama Specie Bank, and others; (3) the Indian joint-stock banks registered under the Indian companies act, whose head offices are located in India; (4) private and unincorporated bankers or money lenders. Statistics relating to this last class (private and unincorporated bankers) are not generally available.

The total amounts of capital, reserve, deposits, and balances of the different classes of banks dealt with in this memorandum for the year ending December 31, 1913, are compared in the table below with those for the corresponding period of 10 years ago:

Classes of banks.	Capital and reserve.		Deposits.		Cash balances.	
	1904	1913	1904	1913	1904	1913
Presidency banks.....	\$19,790,000	\$24,268,000	\$81,595,000	\$137,462,000	\$33,157,000	\$49,898,000
Exchange banks.....	103,949,000	184,083,000	52,948,000	100,672,000	16,027,000	19,077,000
Indian joint-stock banks above Rs. 5 lakhs (\$162,000).....	4,704,000	11,809,000	37,342,000	73,290,000	4,672,000	12,977,000
Total.....	128,443,000	220,160,000	171,885,000	311,424,000	53,856,000	81,952,000

The total paid-up capital of these banks, it will be seen, has risen from \$128,443,000 to \$220,160,000, or by 71 per cent during the past 10 years, the respective shares being: Presidency banks, \$24,268,000, or 23 per cent; exchange banks, \$184,083,000, or 77 per cent; and the Indian joint-stock banks, \$11,809,000, or 151 per cent. The total amount of deposits in the banks, which was made available for financing the trade and industries of the country, increased from \$171,885,000 to \$311,424,000, or by 81 per cent, in the last decade. Deposits in the Indian joint-stock banks increased in a greater proportion than the deposits in the other classes of banks, the relative proportion being: Presidency banks, 68 per cent; exchange banks, 90 per cent; and the Indian joint-stock banks, 96 per cent. The proportion per cent of the cash balances to the liabilities on deposits of these three classes of banks was in 1913 as follows: Presidency banks, 36 per cent; Indian joint-stock banks with paid-up capital and reserve of over \$162,000, 18 per cent; and those under \$162,000, 16 per cent. The proportion per cent in the case of the exchange banks was 19 per cent. It should be noted here that, in the case of the exchange banks, deposits and cash balances in India only have been taken into account.

BANK FAILURES.

Fifty-seven banks have failed, the authorized capital of which was \$32,184,000, the subscribed capital \$13,331,000, or 41.6 per cent of the authorized capital, and the paid-up capital \$4,684,000, or 14.6 per cent of the authorized and 35.1 per cent of the subscribed capital. The greatest number of failures took place in March, 1914, when 8 banks failed. In November, 1913, 7 banks failed. The crisis in northern and western India began in September, 1913, with the failure of the People's Bank of India, in the Punjab, which went into liquidation on November 17, 1913. Since then 56 banks have failed, 28 in the Punjab, 11 in Bombay, 9 in the United Provinces, 2 in Madras, 2 in the Northwest Frontier Province, 2 in Delhi, and 1 each in Bangalore and Baluchistan. The most important failures in each Province were:

In the Punjab.—The People's Bank of India, Lahore; the Popular Bank, Rawalpindi; the Orient Bank of India, Lahore; and the Punjab Cooperative Bank, Amritsar.

In Bombay.—The Indian Specie Bank; the Credit Bank of India; and the Kathiawar and Ahmedabad Banking Corporation.

In the United Provinces.—The Bank of Upper India, Meerut, the failure of which took place recently.

The following table summarizes the available statistics relating to these banks:

Names of banks.	Capital.			Deposits.	Date of liquidation.
	Author- ized.	Subscribed.	Paid up.		
Punjab:					
People's Bank of India, Lahore.....	\$1,136,000	\$714,000	\$407,000	\$4,081,000	Nov. 17, 1913
Popular Bank, Rawalpindi.....	1,622,000	649,000	105,000	604,000	July 28, 1914
Orient Bank of India, Lahore.....	811,000	324,000	23,000	161,000	Sept. 4, 1914
Punjab Cooperative Bank, Amritsar.....	811,000	324,000	265,000	1,549,000	Sept. —, 1914
Bombay:					
Indian Specie Bank.....	6,489,000	4,867,000	2,430,000	.....	Mar. 4, 1914
Credit Bank of India.....	5,244,000	1,822,000	324,000	.....	Nov. 1, 1913
Kathiawar and Ahmedabad Banking Corporation.....	3,244,000	2,457,000	242,000	.....	Dec. 23, 1913
United Provinces:					
Bank of Upper India, Meerut.....	324,000	324,000	324,000	5,954,000	Oct. —, 1914

Deposits in the Punjab amounted to \$9,733,000, of which the People's Bank alone accounted for \$4,088,000; the Punjab Cooperative Bank \$1,492,000; the Amritsar and Lahore banks about \$908,000 each; and the Popular Bank of Rawalpindi nearly \$616,000. In the United Provinces the total amount of deposits in the banks, as far as available, was \$6,002,000, of which the Bank of Upper India is credited with \$5,937,000. For the banks in Bombay, Madras, Bangalore, and Baluchistan the total deposits are not available.

EFFECT OF WAR ON INDIAN BANKING SITUATION.

[By Consul General James A. Smith, Calcutta, Apr. 6, 1915.]

The outbreak of the war found India in an unusually good position to withstand the dislocation of credit and trade, and this condition was due to a number of reasons. In the first place the "swadeshi" (native) banking failures which swept over the country during the autumn of 1913 had removed from the active sphere of operations a large number of badly managed speculating Indian banking concerns. In Bengal the Presidency Bank had a cash balance of 160,000,000 rupees (approximately \$52,000,000), which was almost a record, and their statement showed a percentage of cash against banking liabilities of 56.19. The large exchange banks were also fully supplied with cash in anticipation of the usual autumnal demands on them to move a bumper jute crop. If the crisis had been precipitated later on, say at the height of the jute export season in October and November, matters would probably have proved far more serious, but as it happened neither exporters nor the banks interested in financing India's export trade were committed to any unduly large engagements.

On August 6 the Bank of Bengal raised its rate of discount to 5 per cent, an advance of 2 per cent. The Government intimated its intention to provide funds to the Presidency banks as required, which in their turn would support all legitimate trade requirements. The exchange and local banks adopted a policy of caution, to which the leading firms were only too pleased to agree, until the various financial measures rendered necessary by the occasion had been adopted by the British Government in conjunction with the Bank of England and the future could be foreseen more clearly.

Owing to restricted markets, and also on account of shortage of freight, both exports and imports were materially reduced. At no time during the past eight months has money been anything but abundant and sufficient for all requirements.

FOREIGN CREDITS—LOCAL LOANS—BALANCES.

As regards foreign credits, banks have insisted upon business being financed by means of first-class British bank credits. Foreign bankers and foreign accepting houses have been practically barred until recently, when a certain amount of business had been arranged in London by means of Italian bank credits.

As regards loans made locally, banks confined themselves to financing jute mills, tea gardens, and kindred industries, but any business savoring of speculation has been consistently refused.

There are no figures available as to the amount of the balances which have been carried by the exchange banks during this period,

but it is a well-known fact that they have been very much in excess of former years. In the earlier months of this period there were, of course, withdrawals of deposits from all banks concerned to quite a considerable extent. The Government Savings Bank had withdrawals amounting to 60,000,000 rupees (approximately \$20,000,000).

The Bank of Bengal rate for demand loans at present (Mar. 23, 1915) is 6 per cent, with a percentage of cash against banking liabilities of 39.17, which compares with 7 per cent and 34.83 per cent at the corresponding date a year ago.

The Indian banks have generally sustained their position, with the exception of the Bank of Upper India (Ltd.) and one or two smaller institutions. The first-named bank was quite an old institution, and there is every prospect of the depositors being eventually paid in full. Speaking generally, the Indian banks have come out of the time of stress very well, and this may be attributed to the elimination of unsound concerns, which took place during the latter part of 1913.

CEYLON.

In Ceylon the rupee = 100 cents = \$0.3244}. The system of weights and measures is the same as in the United Kingdom and India.

WEIGHTS AND MEASURES.

The various systems of weights used in India combine uniformity of scale with immense variations in the weight of the units. The following scale is used generally throughout northern India and less commonly in Madras and Bombay. The actual weight of the ser varies greatly from district to district and even from village to village, but in the standard system, which is used in official reports, the tola is 180 grains troy (the exact weight of the rupee); the ser thus weighs 2.057 pounds and the maund 82.28 pounds.

The maund of Bengal = 40 sers = 100 troy pounds (or 82 $\frac{1}{2}$ pounds avoirdupois).

The maund of Bombay = 28 pounds, nearly.

The maund of Madras = 25 pounds, nearly.

The ser = 80 tola = 2.057 pounds avoirdupois.

The tola = 180 grains (0.4114 ounce avoirdupois).

The guz of Bengal = 36 inches.

The name of the unit for square measurement in India generally is the bigha, which varies greatly in different parts of the country. The standard bigha is generally five-eighths of an acre.

The American reader will of course remember that when gallons, hundredweights, and tons are given in tables in this handbook the imperial gallon is to be considered as equivalent to 1.2003 United States gallons; the imperial bushel, 1.031515 United States bushels; the hundredweight, 112 pounds; the ton, 2,240 pounds, and the imperial quarter (of grain), 480 pounds.

Dry and liquid goods are sold by weight in Calcutta, Bombay, and Madras, as there are no standard measures of capacity. Besides the tola, ser, and maund, the weights adopted in Government transactions and by the Indian railway companies include: The masha ($\frac{1}{2}$ tola = 180 troy grains) and the ruttee ($\frac{1}{8}$ masha = 15 troy grains). Besides these there is a factory weight, in which the maund is equiva-

lent to about 74½ pounds, and a bazaar weight, in which the maund is 82½ pounds.

Particular commodities have special weights, such as the following: Cotton is weighed per bale of 392 pounds net; wheat, per bag of 2 hundredweight; oilseeds, per bag of 1½ hundredweight (usually); wool, per bale of 336 pounds; jute, per bale of 400 pounds; and opium, per chest of 140½ pounds. The imperial standard yard, with the foot and inch, of the United Kingdom is the legal standard measure of length in British India. The guz varies in different localities from 24 to 36 inches.

In calculating retail prices, the custom in India is to express them in terms of sers to the rupee. Thus, when prices change, what varies is not the amount of money to be paid for the same quantity but the quantity which is to be obtained for the same amount of money. In other words, prices in India are quantity prices, not money prices. When the figure of quantity goes up this of course means that the price has gone down, which is at first perplexing to the foreign reader.

PYSIOGRAPHY AND POPULATION.

The Empire of India includes four well-marked regions; first, the Peninsula of India, embracing the country that lies south of a line stretching from Karachi to Delhi and from Delhi to Calcutta and including an area of 784,000 square miles and a population of 132,000,000; second, the Indo-Gangetic Plain, lying between the peninsula and the Himalayas, which, with its easternmost extension, forms an expanse of about 300,000 square miles, with a population of 162,000,000; third, the Himalayan Range, which overlooks this plain; and fourth, Burma, forming part of a different peninsula and differing from India proper very markedly indeed, the area of which is estimated at 237,000 square miles and the population at 12,000,000. This classification may be added to by taking into account certain extensions of the boundary outward, chiefly for the purpose of securing better military control over nomadic tribes. Baluchistan which reaches on the west to Persia may be thus included.

INDIAN PENINSULA.

The Peninsula of India may be described as an elevated plateau, diamond shaped, with two long sides running southward and washed by the sea, and two short sides running northward and abutting on the flat expanse of the Indo-Gangetic Plain. Delhi is at its northern extremity. Along its northern boundaries a line of low hills and scarps marks it off from the plain that stretches between it and the Himalayas. Its southern margins are raised and buttressed by coast ranges which overlook the sea from a height varying from a few hundred to many thousands of feet. These coast ranges are known as the Western and Eastern Ghats. The western range is much the more considerable. It increases in altitude as it runs southward, rising from an elevation of 3,000 feet above Bombay to 8,000 feet as it approaches the extremity of the peninsula. It forms a gigantic and continuous sea wall, pierced by no valleys of any size and unbroken save for a very curious gap 200 miles from its southern extremity. The eastern range is much less distinctive and consists of broken and comparatively low hills, interrupted by broad valleys which lead the drainage of the peninsula into the Bay of Bengal. The surface of the peninsula is generally uneven and rocky. Although the plow has been urged to the extreme margin of fertility, not more than a third of the total area is under cultivation.

INDO-GANGETIC PLAIN.

The Indo-Gangetic Plain, which lies to the north of the peninsula and between it and the Himalayas, is the most extensive sheet of level cultivation in the world. Excluding the valleys of the Indus and the Brahmaputra at its western and eastern extremities, it has a length of 1,500 and an average breadth of 200 miles. Over this

vast tract of country not a stone of any kind—not a pebble—is to be found. The land is entirely composed of river sand and silt, and borings have shown that this deposit extends to a depth of at least 1,000 feet below the present sea level.

The rivers which traverse the plain tend in two directions. The five western rivers (from which the Punjab takes its name)—the Indus, Jhelum, Chenab, Ravi, and Sutlej—flow down the lower reaches of the Indus into the Arabian Sea. Seven other large rivers to the east—the best known of which are the Ganges and the Jumna—similarly unite in the Ganges to reach the Bay of Bengal. Approaching the sea through a network of wandering channels, their waters are mingled with those of an eighth large river—the Brahmaputra—which flows from the east down the valley of Assam. The silt brought down by these rivers is gradually enlarging an extensive delta—at the head of the Bay of Bengal—which is perhaps the most characteristic portion of the Province of Bengal. Upon it is situated the city of Calcutta.

The Indus at the extreme west and the Brahmaputra at the extreme east have their sources in Tibet, behind the snow peaks of the Himalayas, at no great distance apart; and, curving round, in opposite directions, include in their embrace practically the whole of the Himalayan mountain chain. The sources of the other rivers are less remote. But their upper valleys all end in snow fields, and they begin to rise from the melting of the snow before they are replenished by the summer rains.

Large areas of the plains remained under scrub jungle till a century ago. At present little that is culturable escapes cultivation, and two-thirds to three-fourths of the total area is broken by the plow. The population is extraordinarily dense; over wide expanses of country it reaches an average of one person to the acre of total area, and this in localities where there are no large towns. There are large districts in which each acre supports two persons. Only a tenth of the population can be classed as urban, and yet its density over thousands of square miles is as high as that of Belgium. In no large country of the world, not even excepting China, does the land directly support so large a population.

THE HIMALAYAN RANGE.

The great plains of India are overlooked by the highest mountains of the world. Some of the peaks of the Himalayas soar to nearly 30,000 feet above sea level, nearly twice the elevation of Mont Blanc. But the lines of snow crests stand 70 or 80 miles back from the foot hills, and it is only on exceptionally clear days that they appear, like clouds on the horizon, to the people of the lowlands. The Himalayas as a mountain chain are really a series of enormous buttresses that support the table-land of Tibet. On the further side of their passes there is no great descent, and the country is a desert of gloomy rocks and barren valleys swept by the piercing wind of a plateau that ranges between 10,000 and 15,000 feet above sea level. At the eastern end of the Himalayas the lower slopes are densely forest clad; at the western end, with a lighter rainfall, they are bare, or scarcely covered by ragged pine forest and scrub. Toward the western extremity of the range, is the famous Vale of Kashmir, which is in-

cluded within the State of Kashmir. Up to a height of at least 8,000 feet the Himalayas are inhabited by as large a population as they can support. Little can be grown without irrigation. Rivers are carefully led over their valley beds, and not a stream falls from the hill-side but a village lies beside it, conducting its waters down the fields that are terraced on the slopes.

BURMA.

The Province of Burma consists of the valleys of the Irrawaddy, the Sittang, and the Salween Rivers and of a series of parallel hill ranges which separate them from one another and from the sea. These ranges are, geologically speaking, of recent origin. They run for the most part north and south. On the side of the Bay of Bengal they break up the country into a number of long narrow ridges drawn as if it had been furrowed by a gigantic plow. Across these ridges, from west to east, progress is exceedingly difficult, and hence the Burmese railways have as yet not been connected with the Indian system. These hills are sparsely inhabited by tribes of the Tibeto-Burman race, which have hardly emerged from a condition of primitive savagery and until recently found their chief interest of life in intertribal conflicts and the practice of head hunting.

Farther east, beyond the Irrawaddy, the hill summits become broad and flat, widen in fact into plateaus which contain much cultivable land, and support an intelligent people known as the Shans. In origin "Shan" is the same word as "Siam," and these hillmen are closely allied to the Siamese. By far the most important of the valleys of Burma is that of the Irrawaddy, with its affluent, the Chindwin. In its upper reaches bays of rice fields are formed by the recession of the fringing hills. Some 200 miles above the river mouth the valley opens out into a broad cultivated plain, which gradually expands into a delta of remarkable fertility. The valley of the Irrawaddy is the principal home of the Burmese people, who, while connected by racial affinities with the wild tribes of the hills that surround them, have developed under the influence of a fertile soil a civilization which ranks high by the Asiatic standard. They are Buddhists by religion.

CLIMATIC CONDITIONS AS RELATING TO TRADE.

A description of the physical aspects of India would be incomplete without a reference to the rainfall, the fluctuations of which bring happiness or misery to millions of the people. While in America a rainy day, or a succession of rainy days, may be expected during any month or week of the year, in India rain falls only during certain definite seasons. From February to May the skies are practically cloudless and dryness gradually develops into parching heat, violent dust storms sweep the country, drafts from the hills may at times bring a few drops of rain or a fall of hail, but these are casual occurrences, not reckoned upon in the economy of the country, which during this period of the year depends for its moisture upon what is stored in the soil or flows down the rivers. Toward the end of May banks of clouds appear upon the seaward horizon, and, heralded by violent thunderstorms, there occurs what is known as the "burst of the

monsoon." Thence onward to October the atmosphere is saturated with moisture and rain falls at frequent intervals. In October the clouds withdraw and the air becomes dry, crisp, and invigorating. In December clouds should again appear, coming this time from the north, across the barrier of the Himalayas; and during a fortnight or three weeks there should be falls of rain, which, but 2 or 3 inches in aggregate amount, are of inestimable benefit to the standing crops. The clouds again draw off and a new cycle commences in the drought and heat of the five months following.

The rainfall varies greatly from place to place. Below the steep western coast range the rainfall commonly exceeds 150 inches. On the other side of India, north of the Bay of Bengal, the Assam hills offer a precipitous barrier, 4,000 feet high, to the progress of the clouds that drift from the sea over the lowlands, and here the rainfall is the heaviest in the world, normally 450 inches and having been known to amount to 50 feet. The greater part of the country ordinarily receives amounts ranging between 30 and 75 inches. Over the western portion of the peninsula the rainfall generally decreases from west to east, possibly by reason of the drying of the west sea winds by the extraordinarily heavy condensation that takes place upon the west coast range. In the lower valley of the Indus lies the desert of Sind, which is rainless, but is irrigated from the river by such a network of canals as spreads the waters of the Nile over the fields of Egypt.

The great irrigation works of the country and its periodical famines are of course the result of periodical droughts and of a low rainfall. The alternate excess of humidity and then dryness, together with the great heat of most districts, requires considerable consideration as regards packing of goods. For instance, the rainfall during the wet season at Rangoon and on the Bombay coast exceeds 100 inches, as compared with 30 or 40 inches in New England. Iron and steel rusts rapidly under these conditions, leather goods become covered with mold, furniture warps, and most provisions have to be sealed in tins.

The hot climate in most districts requires cotton to be the leading material of apparel and accounts for the enormous importation of cotton piece goods.

The monsoon is to India what the Nile is to Egypt in the general prosperity of the country. A poor or irregular monsoon may not only cause acute suffering in many districts but also make for bad business conditions throughout the country and a falling off in imports. A good monsoon, on the other hand, brings vitality and strength into every branch of business and increases imports. The monsoon has such an important effect on general trade that the season in which it occurs will afford data for deciding on a business policy for the year either of curtailment or of expansion. There is a reluctance to enter into business engagements until it is known whether the monsoon is a success or failure. For this reason commercial travelers find the most advantageous time for entering India is toward the end of the monsoon or in September and October. They can then have the advantage not only of cooler and healthier conditions for personal work, but also can find their customers in a more definite frame of mind as regards purchase of goods.

India lies almost opposite Mexico on the globe, going east and west. Calcutta and Bombay, the two chief ports, are about the latitude of Vera Cruz and Mexico City. India is so much larger than Mexico

that it extends relatively as far south as Panama and as far north as the city of Washington. A little more than half of India is in the North Temperate Zone; less than half is in the Tropics. Northern India is warmer than these facts would imply, for it consists of a low plain, partly desert in the west, sheltered by the Himalayas. But there are large districts with temperate climate that border on regions of perpetual snow.

POPULATION.

According to the census of 1911, the Indian Empire contains 1,802,657 square miles, or some 36,000 more than in 1901. The Provinces under British administration comprise 1,093,074 square miles, or 60.6 per cent of the total, the remainder being included in the various Native States. The total population is 315,156,396; of which British territory contains 244,267,542, or 77.5 per cent, and the Native States 70,888,854, or 22.5 percent. Comparison of these figures with the area and population of European countries is interesting. The area of the Indian Empire is equal to that of Europe, excluding Russia. Burma is about the same size as Austria-Hungary. The Bombay Presidency is comparable in area with Spain. Madras, the Punjab, Baluchistan, the Central Provinces, Berar, and Rajputana are each larger than the British Islands; the United Provinces and the Province of Behar and Orissa, than Italy; and Hyderabad and Kashmir, than Great Britain, excluding Yorkshire. The population of India is considerably more than three times that of the United States. The United Provinces and Bengal, with the States attached to them, both have as many inhabitants as the British Islands; Bihar and Orissa, as France; Bombay, as Austria; and the Punjab, as Spain and Portugal combined. In the whole Empire there are on the average 175 persons to the square mile, or much the same as in Europe, outside of Russia. In the British territory the number to the square mile is 223, and in the Native States 100. The former figure exceeds by 34 the density ratio in France, while the latter is identical with that in Spain.

RACES, RELIGION, AND SOCIAL LIFE.

India is not a homogeneous country, but is composed of a great number of different States, with different religious and social characteristics and different languages. The number of languages spoken and written in India is about 150, and it is said that the Bible has been translated into nearly 50 of these languages. English, however, is understood by all the educated classes and is the chief commercial language. The British-born population resident in India numbers about 122,000 persons. About 13,000 Americans are in the country, chiefly missionaries, many of whom do an excellent work in promoting technical, agricultural, and medical education in addition to their religious propaganda. The American missionaries, for instance, at Ahmednagar, in the Bombay Presidency, whose missions are the oldest in India, maintain technical schools ranking with the famous Tuskegee Institute in Alabama. The largest European population is at Calcutta.

The term Hindu is used in its broadest sense to signify any native of India. It is also and more properly used in a religious sense to apply only to the two-thirds of the population who are "Hinduized"; that is, who profess Hinduism and have a certain social organization based upon Brahmanism. Ethnologically the word Hindu may be defined in a still different sense as signifying the three-fourths of the population of northern India who are of Aryan stock, whether professing Hinduism or Mohammedanism.

India may be said, loosely speaking, to be divided among three great races, the Hindus of northern India, who are in origin Caucasian; the Dravidians of South India, a dark race often resembling the Ethiopian more than the Caucasian; and a Mongolian fringe in the extreme northeast and along the foot of the Himalayas, which came largely from Tibet. Burma, lying outside the Indian Peninsula toward the east, is naturally Mongolian, being closely related ethnologically to China. It belongs to India politically, but not from the point of view of race or physical geography.

As to religion, Hinduism predominates everywhere except in the northwest, where it shades off into the universal Mohammedanism of the countries farther west. The latter religion is found to some extent in all parts of India as well, especially in the northeast. One-third of the population is Mohammedan in certain districts in South India. Buddhism is confined mainly to the Mongolian population of Burma. There are 8,500,000 Animists in the country who worship the spirits which they consider to be in trees, rocks, and the like. The Parsis are a small religious group of Persian origin, numbering only about 50,000, but of great importance in India as merchants and financiers. A chief feature of their religion is worship of the elements, such as fire, water, etc., which they consider as having sacred attributes. They dispose of their dead by depositing them on towers for vultures to consume. The Hindus include about 70

per cent of the whole population. There are only about 4,000,000 Christians in the country, about half of them in the Madras Presidency. The prevailing religion of Portuguese India at Goa is Catholic.

RELIGION HAS BEARING ON TRADE.

Religion plays an extremely important part in the lives of the people and has a very important bearing on trade and industry. One of the chief peculiarities in the food of the people that affects commerce is the feature of the Hindu religion regarding the cow as a sacred animal and the abhorrence of the use of grease. It is considered a sacrilege to kill a cow, and good Hindus under no circumstances will touch the meat, tallow, hides, or similar articles in trade. The objection of some native regiments to using cartridges which had been greased with tallow is said to have precipitated the great mutiny of 1857. Articles of food which might otherwise be suspected by Hindu purchasers, but which are really free from objectionable materials, should be so labeled. It is often desirable also that articles which have not been touched by hand in their manufacture and which are purely machine products be labeled to that effect, as it is not permitted to some castes to even touch an object which has been touched by the foreigner or one of lower caste. The refusal of natives of different castes to work together and the restricting of different castes to separate kinds of work is responsible in large measure for the great wastefulness and inefficiency of the country industrially.

To a great extent the religious prejudices which affect India are gradually breaking down and social customs are getting more into line with modern European ideas. Many States are passing laws to prevent child marriages. The British Government rigidly prohibits infanticide, and has broken up the custom of widows sacrificing themselves on the funeral pyres of their husbands. Except, however, as regards prevention of cruelties or crimes, the British Government never interferes in the slightest degree with religious customs of the people. India has a number of criminal tribes who live by robbery. The Salvation Army, in cooperation with the police authorities of the country, is gradually reforming these tribes and educating them to usefulness in industry.

COMMERCIAL LANGUAGES.

Hindustani, or Urdu, is the language most widely spoken by the natives and most generally useful. It is spoken throughout the greater part of India by educated persons. The Hindi dialect, which includes the Hindustani, properly speaking, and the related Bihari, is spoken by a population as large as that of the United States; that is, by one-third of the population of India. Bengali stands next in importance numerically, being spoken by nearly 50,000,000 persons. Gujarati is the great commercial language of western India and is used also by the Parsis. Marwari is another commercial language of some importance. The most important language numerically next to the Bengali is the Marathi, the language of the Mahrattas, an important people who were the rulers of southern India before the British conquest.

There are great extremes of wealth and poverty in the country. The native princes and nobility are for the most part extremely rich and have fine palaces, magnificent jewelry and precious gems, and numerous motor cars, while the great masses of the people do not earn more than the equivalent of about \$3 per month. The Hindus are all vegetarians, and some castes will not even eat fish. The Mohammedans and Parsis eat meat except pork and other hog products. The women of the upper classes, both Hindus and Mohammedans, are mostly in "purdah"; that is, veil their faces and do not associate in any way with men except in their immediate families. Among the lower classes women are not so secluded and are expected to do considerable manual work. About 95 per cent of the people, generally speaking, are illiterate; nearly all women are illiterate. Polygamy is countenanced by local laws and customs, but is practiced chiefly by the upper classes, who are able to afford the luxury of more than one wife.

COOPERATIVE CREDIT MOVEMENT.

A significant feature in the economic development of India is the rapid spread of the cooperative credit movement. In its application to agriculture the principle of cooperative credit and collective association for the common good now appears to render possible important improvements in agriculture and in the general welfare of the farming classes.

While 10 years ago there were only a few scattered experiments to indicate the presence of cooperative movement in India, to-day there are over 12,060 societies with nearly 600,000 members, having a working capital of over \$15,000,000. Including the families of the members, the numbers directly affected can scarcely be less than 3,000,000, and taking into account the general reduction of the rate of interest and similar benefits to outsiders, which have followed the spread of the movement, it can fairly be claimed that cooperation has already brought relief to some 6,000,000 people—a gratifying and indeed a phenomenal outcome of the work of 10 years.

It is true that there is still only one agricultural cooperative society in India for every 20,000 of the population engaged in agriculture, whereas in Italy there are 18 and in Germany 52; but the movement in India is only at its beginning, and the progress made in the first stage has been unequalled in any other country. In economic benefits it has been calculated that in interest alone the agriculturists of India, by taking loans from cooperative credit societies, instead of from the village money lenders, are even now saving themselves from an absolutely unnecessary burden of at least \$650,000 per annum, and there is no reason why in a few years this figure should not be multiplied several times.

BRINGS INCREASED PURCHASING POWER.

Also, with the progress of cooperation, hoardings of money have been brought forth and placed on deposit; money that would otherwise have lain idle has found serviceable investment; otherwise inaccessible capital has come into the hands of agriculturists; old debts have been paid off and old mortgages redeemed; and there are cases where even the debts and mortgages of whole villages have been cleared off. This improvement in the economic position of the people must result in an increase in their purchasing power and in the expansion of external and internal trade.

Cooperation has also stepped in to assist the Agricultural Department in bringing home to every cultivator the benefits that agricultural science offers by providing the means whereby, as each improved variety of seed is perfected and made ready for use, it can be conveyed from the Government farm to every village over large areas and can be multiplied a thousandfold. It has also enabled the purity of the seed to be maintained and the best price to be secured for the produce; it has placed within reach of the cultivator cheap

manure and implements, tested and approved by experts; it has supplied to cattle breeders bulls of superior strains for the improvements of the village herds; and it has provided the means by which useful information can be disseminated.

BENEFIT OF THE COOPERATIVE SPIRIT.

The fact that the members are ultimately responsible for payment of the debts of each and every member operates as a powerful check on expenditure on unproductive purposes greater than that absolutely required by public opinion. Marriage expenses have accordingly been curtailed; drunkards and gamblers have been reformed or excluded from societies; while self-restraint, punctuality, straightforwardness, self-respect, discipline, contentment, and thrift have been encouraged. In some areas, litigation has markedly decreased; in others, the common funds have been used to start schools, to provide scholarships, to distribute quinine, to provide drinking wells, and to clean streets. The impetus of cooperative credit has led to the establishment of savings banks, benefit funds, and provision for the poor.

GOVERNMENT AUTHORIZATION—MORTGAGE TRANSACTIONS.

The present cooperative credit society movement originated with the Government of India while Lord Curzon was Viceroy, a committee having been appointed to devise a suitable scheme for the formation of such societies under Government supervision. As the result of the recommendations of this committee an act was passed in 1904 to sanction the appointment in each Province of an officer for organizing cooperative credit societies and for working them satisfactorily.

Of the total number of mortgage transactions since the commencement of these societies a little over half have been found to relate to transactions of not over 100 rupees (1 rupee = \$0.324). It is thus seen that the movement is of special assistance to the poorer classes, who have been accustomed in the past to borrow only at extraordinarily high rates of interest. Through the credit afforded by these cooperative societies they can obtain money at 6 to 15 per cent, whereas ordinarily small farmers have been obliged to pay as high as 20 to 35 per cent. India is a country where the holdings of land of agriculturists are extremely small on the average, so that most of the farmers are very poor, consequently the difficulties of obtaining credit for farm purposes have been great even at the extraordinary rates of interest paid. Wherever in India the cooperative movement has been particularly strong the ordinary money lenders have been obliged to reduce the rates of interest to compete with it and to show more consideration for debtors.

OFFICIAL REGULATION AND GUIDANCE.

While these cooperative societies receive a certain amount of Government help in loans, by far the most important benefit they derive from the Government is in the general regulations of their affairs and the audits of their accounts by well-qualified officers of the Government, which give them a quasi official standing and inspire

confidence which would otherwise be lacking. It is because of this sort of Government assistance that the cooperative societies are enabled to secure large loans on behalf of their members from well-to-do individuals and well-established banking institutions which would be wholly unwilling to make loans to members of these societies if their credit were not thus safeguarded. The most serious problem at present in connection with the rapid growth of these societies is that the Government finds it increasingly difficult to provide the necessary supervision and audit, and the registrars who have charge of this work in more than one Province are now becoming anxious as to the efficiency of the control for which they are responsible. It seems, therefore, likely that the Government of India in the future will either feel obliged to organize a special department to have general management of these societies, which, of course, would have to undertake extremely serious responsibilities, or perhaps intrust such powers and responsibilities to a general committee selected by the societies themselves, which might act under the advice and guidance of officials of the Government of India. It seems obvious that, however well cooperative credit societies may succeed in other countries without any government regulation or supervision whatever, in India any removal of government oversight and audit of the transaction of these societies would cause loss of public confidence and the general disruption of the cooperative credit movement.

BROADENED FUNCTIONS.

Although originally the cooperative credit societies in India had no other object than the obtaining of cheap credit for their members, and in fact were not authorized by the Government to do anything except supply funds to their members, yet more recently the possibility of their usefulness in an educational way, and in promoting agricultural improvement especially, has been conceded by the Government, and in 1912 an act was passed which allowed the formation of societies with still more profitable ends in view than the loaning of money. At the recent conference in Simla, Dr. Harold Mann, the principal of the Agricultural College of the Bombay Presidency at Poona, who was chairman of a subcommittee which had investigated the question of how cooperative societies could be made more useful in the dissemination of agricultural improvements, suggested that there should be a close relationship between these societies and the various agricultural departments and farm-implement depots of India. He said:

Even without going beyond the old function of the societies, that of supplying credit, the cooperative societies had been used and were still being used to spread improvements. They had often been used to spread literature and were one of the most effective agencies in doing so. They had in some cases, as, for instance, in Eastern Bengal, taken the advice of the Agricultural Department with regard to advancing money for improvements or so-called improvements to be made by their members, and if the Agricultural Department got into close touch with these societies the latter would more and more frequently appeal to the departments for guidance in making advances, and thus many promising schemes could be encouraged and many fantastic ideas, which would surely arise if money was available, could be checkmated at the outset.

These things could be done without any extension of their old powers, but as soon as it became possible for cooperative credit societies to extend their functions they began to do so, in many cases under the guidance of the Agricultural Department.

One of the first signs of this was the wish on the part of a number of rural societies to carry a stock of implements and sometimes of seeds for sale or hire to their members. This had been done in a number of Provinces and had often proved a very great convenience, besides being profitable to the societies themselves. Stocking of implements and spare parts was easy, but that of the seed was more difficult, and a good deal of care must be exercised in recommending ordinary credit societies to undertake it. The greatest development of miscellaneous agricultural functions had perhaps been reached in the case of some societies in the United Provinces. There the relation between the department and certain societies was very close. These societies, hitherto entirely credit organizations, must enlarge their functions and definitely recognize agricultural improvement as a duty toward the members.

The broadened functions of cooperative credit societies in India, as thus outlined by Dr. Mann, should be of much interest to American farm-implement manufacturers, who in the future might find it advantageous to approach the management of such societies regarding the stocking of the implements they manufacture [as has been done successfully in Russia through the zemstvos]. The mere financing for members of purchases of implements was most significant, but when such cooperative credit societies become willing to make actual purchases themselves of implements to resell to members, the situation must naturally become much easier and still more encouraging from the standpoint of implement manufacturers, who have previously found the poverty and ignorance of individual Indian farmers an almost insurmountable obstacle.

EDUCATION.

The increasing spread of education in India, with which the demand for textbooks must necessarily keep pace, is shown in the statistical table of educational progress in British India, published in March, 1913, wherein the grand total of pupils in all educational institutions in India, including private institutions, amounted to 6,780,721. The increases in the United Provinces, the Punjab, Eastern Bengal and Assam, and the Northwest Frontier Province amount to over 9 per cent of the total figures for 1910-11. The increase in pupils during the quinquennium ending 1907 was 866,732; during the quinquennium ending 1912 it was 1,392,089.

The percentage of those at school to those of school-going age (reckoned at 15 per cent of the population) has risen in the case of boys to 26.8, in that of girls to 4.7, and in that of both to 16. The percentage of both boys and girls in public and private institutions together has advanced from 16.9 to 17.7, and the percentage of the whole population from 2.5 to 2.6. Bombay, Bengal, and Eastern Bengal and Assam show over 33 per cent of boys of school-going age at school in public institutions; Madras over 30 per cent and Coorg nearly 30 per cent; Burma and the Central Provinces over 20 per cent; in the United Provinces, the Punjab, and the Northwest Frontier Province the percentages range from 13 to 17. The figures for the higher institutions are as follows:

	Male.	Female.	Total.
In colleges.....	35,915	369	36,284
In high schools.....	390,857	16,903	407,765
In middle schools.....	470,725	45,880	516,605

In primary schools there are 4,202,631 male and 785,511 female students. There has been an increase in every Province.

The number of those under training for the profession of teaching has risen by nearly 800, and now stands at 13,354. The number of those who qualified indicates a slight falling off and was 4,282. Technical school pupils number 12,064, an increase of 1,529. The number in schools for Europeans and the domiciled community has increased by 876 and now stands at 33,720.

The increase in Mohammedan pupils has been noteworthy, amounting to 100,597. In secondary schools and colleges the increase has been 15,973, in elementary schools 73,266. The total in institutions of the former kind is now 174,401, in those of the latter 1,022,768. The remainder of the increase and of the totals are in institutions of other kinds, the complete total being 1,316,998 pupils, of whom 533,333 were in the Provinces of Eastern Bengal and Assam.

UNIVERSITIES—GOVERNMENT MODELS.

There are in British India five universities, including University of Calcutta, of Madras, of Bombay, of Allahabad, and of the Punjab (at Lahore). The average annual number graduating is reckoned at 1,935, of whom 85 per cent are in arts, 20 per cent in science, 9 per cent in medicine, and 4 per cent in engineering.* Affiliated with these universities are colleges, of which there are 176, including 161 arts colleges, 3 law colleges, including the law school at Bombay, 4 medical, 3 engineering, 1 oriental, 1 agricultural, and 3 teachers' colleges. All colleges, whether under Government or private management, are inspected by the universities. Colleges receive financial aid from public funds, both provincial and imperial.

The Government policy with regard to schools is to provide a small number of institutions which are to be regarded as models for private enterprise. At the same time they insist on a careful inspection of all schools, whether they are run by municipalities or local boards, by private individuals or by missionary or other societies. Private enterprise is encouraged by an extensive system of grants-in-aid, which are dependent on the efficiency of the school and its expenditure on teachers and general equipment.

TECHNICAL EDUCATION.

Industrial schools are found dotted about India, some maintained by the Government, others by municipalities or local boards, and others by private bodies. One of the most important institutions of this type is the Victoria Jubilee Technical Institute in Bombay. There is also the well-known Thomason College of Engineering at Roorkee, the College of Science at Poona, and the Sibpur College in Bengal. There are schools of art in the larger towns of India where not only architecture and fine arts are studied, but also practical crafts like pottery and ironwork. There is also a school of forestry at Dehra Dun, in the north of India. Besides these there are many medical schools and colleges which prepare students for the medical degrees of the various universities and of which the Grant Medical College in Bombay may be taken as a good example. There are agricultural colleges, the most important of which is the Pusa Agricultural College and Research Institute, which trains experts in specialized branches of agricultural science, such as agricultural chemistry, economic botany, mycology, and entomology. There may also be mentioned the important Indian Institute of Science at Bangalore, State of Mysore, India.

MARKET FOR TEXTBOOKS.

In conversation recently with the representative in India of a leading London publishing house, it was mentioned that India, and especially the Province of Bengal in northeastern India, in which Calcutta is located, affords an important market for educational textbooks.

The more ambitious and intelligent young people in India evince a great thirst for education, as the principal means of rising superior to their environment and improving their conditions in life, so that

* In some universities the arts degree is given for science subjects, thus accounting for the apparent duplication.

every possible sacrifice is made to get an education. There is a special desire in India for employment in Government positions, as such positions give fixed income and have special social advantages. English education is considered essential for those who wish to have the best success, and a large proportion of the textbooks are in the English language, although many of the more rudimentary books are translated into native languages. The most elementary schools for natives in India begin their instruction in vernacular languages and then teach English later on, and finally considerable instruction in many courses may be given in the English language from English textbooks, and in higher education most of the courses may be given from English textbooks. In some instances, instruction in English is given at the start. Among the young people in the Province of Bengal, where there is by far the largest opportunity of employment by European commercial houses, such as are concentrated at Calcutta, there is an especially keen demand for education from English textbooks. No city in India contains anything like the number of fairly well-educated English-speaking native clerks, typists, etc., as does Calcutta.

LIMITED USE OF AMERICAN BOOKS.

The textbooks used in English are mostly supplied from English publishing houses. About three well-known English publishing houses are well represented in India and do a large business in educational textbooks, chiefly by English authors. The only two educational works by American authors, which to my knowledge have been used in India, are Buchanan's Textbook of Anatomy and Woodrow Wilson's "The State," which are used in several of the local colleges. For textbooks on geography, history, composition, grammar, and arithmetic there is a large sale, and in the technical schools and colleges there is a demand for many specialized higher educational works. I am told that one possible objection to the use of American textbooks in India is that such books frequently contain references and expressions which could not be readily understood in India without special explanation by teachers familiar with the United States. Consequently it has been suggested that if American publishers wish to supply textbooks for India, it might be well to have them written or at least revised by well-educated and well-known residents in India, who understood local peculiarities and whose local reputations would perhaps facilitate the sale of the books.

EDUCATION OF PRINCES AND NOBILITY.

As the progress and prosperity of the various Native States of India depend so much upon the character, education, and ability of the native hereditary rulers, and as the question of their proper preparation for the great responsibilities they are to assume over the lives and property of their subjects is of such vital importance, it was deemed of interest, in connection with my commercial investigations through India, to stop for a day at Ajmer, in Rajputana, the site of Mayo College, the leading educational center for the princes and nobility of India.

Mayo College was founded in 1873 through the influence of Lord Mayo, at that time Viceroy of India. A monument to his memory

erected just in front of the main building of the college mentions that "It was his hope that the college of which he first suggested the foundation might promote among the youth of Rajputana the cardinal virtues of fortitude, temperance, justice, and benevolence, of which his own life gave a splendid example." In general, it was intended that this college should have a civilizing and progressive influence in India, and by beginning at the top stratum of Indian society, inculcate generally the principles of morality, culture, and economic usefulness. This intention has been splendidly carried out, and the visible effects of it are to-day apparent in the high ideals and progressive government of many of the native rulers of India who have graduated from this institution, among whom may be mentioned the Maharaja of Alwar, the Maharao of Kotah, the Maharawal of Dungarpur, the Maharaja of Holkar of Indore, the Raja of Dewas, and the Rana of Barwani; also Maharaja Bhairon Singh and the Maharaja of Bikaner. Some of the most promising future rulers of India have also received their education here, including the Crown Prince of Kashmir, who has already attained a favorable reputation because of personal manliness, culture, and progressive sentiments.

MANAGEMENT, ENDOWMENT, AND CURRICULUM.

Mayo College is managed by a committee of native rulers, mostly of States within Rajputana, including the Maharaja of Alwar, the Gaekwar of Baroda, the Maharaja of Bikaner, the Maharaja Scindia of Gwalior, the Maharaja of Jaipur, the Maharaja of Kishangarh, the Maharao of Kotah, the Raja of Sailana, the Maharana of Udaipur, the Raj Rana of Jhalawar, the Maharajadhiraj of Sirohi, the Raja of Dhar, and the Maharaja of Rewah. Since 1893 the college has especially progressed and prospered with Mr. C. W. Waddington as principal. The school also has five other English masters and instructors, nine Indian assistants, a Brahmin religious instructor, two medical officers, a riding master, and a superintendent of games.

The college is constructed of white marble and the architecture of the main building and subsidiary buildings and dwelling houses is of an imposing Mogul type. These buildings include, besides the main building and annexes, a fine gymnasium and stadium, a sanitarium, guest house, seven masters' and guardians' houses, also a number of boarding houses, which were erected by different Native State governments, for the accommodation of their young princes and nobility attending the college. The college grounds cover about 260 acres, with a cricket pavilion in the middle. The cost of the buildings and grounds has approximated over \$1,000,000.

This college now has an endowment fund of about \$350,000, contributed chiefly by native rulers. It receives about \$10,000 annual contributions from Native States and private persons, and also nearly \$20,000 subsidy a year from the British Government. Its total receipts, including tuition fees, amount to over \$50,000 per year. At present there are 202 students at the school, of whom 163 are princes and nobility of the different States of Rajputana, and the remainder are from Baroda, the United Provinces, Nepal, Orissa, Hyderabad, Kashmir, and Central India.

The college is what would be known in the United States as a preparatory school, such as Andover or Exeter, or as Eton in England.

After graduation from this college, students may take postgraduate courses at the same institution if they desire, which would correspond to university courses in the United States, or they may then go to universities in England or in the United States for further training. The educational courses are given in English, Hindi, Urdu, and Sanskrit and Persian. They include a range of subjects such as English and Indian history, geography, arithmetic, English prose and poetry, physics and chemistry, political economy, geometry, algebra, revenue, theoretical surveying, and law, as well as special attention to certain practical governmental administration problems, as famine relief and management of State finances, civil and criminal codes, etc. Large attention is paid to lessons in horseback riding and military drill, also to the encouragement and regulations of such outdoor sports as polo, cricket, football, etc.

AMERICAN LITERATURE IS LACKING.

The college has a large library which is much used, but the only American literature I found there were several of Mark Twain's books. I would suggest that as most of the prospective rulers of native States who are being educated here, will in the future be obliged to take much practical interest in such subjects as irrigation, well boring, pumps, agricultural implements, and other articles required for the prosperity of their people, any contributions from manufacturing, commercial, or educational organizations in the United States concerning American methods and appliances might have considerable value in this library.

In a private discussion I had with one student of this school, who is soon to be the ruling chief of about 50 village communities in Rajputana, with life and death power over his subjects and with almost absolute power in administrative matters affecting the prosperity of his people, I found he was particularly interested in the use of artesian wells in the United States, and he thought that if deep borings could be made in Rajputana at comparatively small cost it would solve the most pressing economic problem of the country, the land being very dry and there being no rivers conveniently at hand to irrigate from.

WIDE RANGE OF TRAINING.

The students of this school appear to show remarkable proficiency in arithmetic, especially in sums which they figure out mentally. The multiplication table as taught at Mayo College does not end with 12 times 12, as taught in the schools of the United States, but with 25 times 25. Moreover, the students commit to memory multiplication figures covering fractions as well as integers. There is a liberal system of awarding prizes for competitive merit, and for general scholarship and deportment. Prizes are even awarded for killing snakes, 106 prizes having been granted last year for snakes destroyed in the vicinity of the college. The general discipline of the school is very rigid. For small offenses, extra hours of study are prescribed, and in case of serious moral offense the younger students may receive some moderate physical chastisement, while the older students would be summarily expelled. A good many of the students have special

guardians with them. They are all allowed to have every legitimate amusement, and a few of them have private motor cars. Generally speaking, their life at the college is wholesome and comfortable, although not approaching in luxury the fine palaces they may later occupy. The excellent manners, politeness, courtesy, etc., of the boys is very noticeable, and their philanthropic spirit is shown every year by their large personal donations for purchase of food and blankets to the poorest people in Ajmer and for giving sweetmeats to children of the poor schools. The boys of the college are all dressed in white except for bright-colored native turbans.

ENVIRONMENT—LASTING BENEFITS OF INSTRUCTION.

The city of Ajmer, where the school is located, is an interesting place, and is a most important city of Rajputana. It is some 2,000 feet above sea level, and has the distinction of being the highest city on the plains of India. It has a population of about 86,000. There are many beautiful lakes and hills about, and interesting relics of ancient art and architecture. There is an important American Methodist mission school here.

Rajputana covers a very large area in northwestern India between the Provinces of Sind and the Punjab, and is composed of 18 Native States, the most important of which are Bikaner, Jaipur, and Udaipur. As a particular instance of how education acquired at this college has benefited these Native States, I may mention the remarkable development which has occurred in Bikaner under its progressive Maharaja, who was one of the early graduates and one of the most generous patrons of this college.

OTHER LEADING EDUCATIONAL INSTITUTIONS.

There are three other colleges in India for Indian princes and nobility, though they are not so important or so well endowed as the Mayo College at Ajmer. They include the Daly College, at Indore, central India; the Aitchison College, at Lahore, Punjab; and the Rajkumar College, at Rajkot, Kathiawar.

With the growth of nationalistic spirit in India, a reaction is noticeable in many influential native quarters against the education of the native youth of the country in Christian schools and colleges, and there has been an agitation for the erection of a large Hindu University at Benares, the sacred city of India. This movement has culminated in the organization of a number of district committees, which have raised a considerable part of the 50,000,000 rupees (\$16,221,700) endowment required for the proposed Hindu University. The early erection of the new university at Benares therefore, seems assured.

SCHOOL OF TROPICAL MEDICINE.

[By Consul General James A. Smith, Calcutta.]

The foundation stone of the new School of Tropical Medicine at Calcutta was laid on February 24 by the Governor of Bengal. The Government of India provided \$195,000 for the site and laboratory and is to contribute for the upkeep of the school. The institution is

unique in the Tropics. The special work of the laboratory will be to investigate on practical lines the causes of tropical diseases in the Calcutta hospitals, with a view to finding more accurate methods of diagnosis and improved treatment. Tropical diseases cause over one-third of the deaths in Calcutta, and at least a large proportion in India as a whole, and the possibilities of carrying out practically important investigations of such diseases will be limited only by the amount of financial support afforded the new institution.

An appeal has been issued by the promoters of the institution for financial support and, because of the world-wide importance of such a school located on the spot where tropical diseases are ever present and the opportunities for research work as regards them unlimited, it is hoped that liberal subscriptions will be made by individuals everywhere. The institute will accept students from all over the world, and this report is written with the idea of suggesting that the attention of various medical research institutions in the United States be called to the school, and, if possible, students from such institutions may be sent here for study and research work in tropical medicine under scholarships endowed by individuals or by the institutions themselves. Communications in this respect and in reference to the school should be addressed to Lieut. Col. Leonard Rogers, I. M. S., Medical College, Calcutta. The consular officers of other powers are calling the attention of their Governments to the school, which it is planned to complete within a year's time.

PRINCIPAL CITIES.

The majority of the people of India live not in large cities but in villages and on their small holdings of land. Nevertheless, the foreign trade of the country is carried on at the large cities, Calcutta, Bombay, Madras, and Karachi; and some of the interior cities, Cawnpore especially, have a great industrial importance. Many other towns are of interest, more because of their architectural and historical associations than on account of their commercial importance. India does about three-quarters of its over-sea trade through Calcutta and Bombay. In Calcutta the native Indian trading community has generally been content to deal with other countries through the agency of European firms; and, although Indian merchants are gradually entering into direct relations with importing and exporting houses in Europe, nine-tenths of the trade passes through the hands of the European colony in Calcutta. In Bombay, however, native merchants, especially Parsis, handle a large proportion of the foreign business. The jute mills of Calcutta are mostly in European hands; but a large proportion of the capital of the cotton mills of Bombay has been subscribed by Indians, and many of the mills are controlled by Indian managers. To Karachi Europeans have been attracted by the large export trade in wheat, and to Rangoon by the export trade in rice and by the financing and management of rice and timber mills. In Calcutta, Bombay, Karachi, Rangoon, and Madras a considerable number of retail shops are in European hands. Upcountry there is a mercantile settlement of Europeans at Cawnpore, a large collecting and distributing point, where there is an important group of factories. In a less degree this is also the case at Delhi, the new capital of India.

CALCUTTA.

Calcutta, the capital of the Province of Bengal and until recently the capital of the Indian Empire, is the chief port and commercial city of India. It has a population of 1,222,313. The city is on the Hoogly, a branch of the Ganges River, 80 miles from the sea at the extreme northern part of the Bay of Bengal. It has the modern conveniences of gas, electricity, street cars, hospitals, clubs, and commercial establishments. It owes its first rank in commerce among Indian cities to the fact that it is situated at the mouth of the two great fertile river valleys, the Ganges of northern India and the Brahmaputra of Burma in Farther India. Situated midway between Europe and the Far East, it is a meeting place for the commerce of the east and the west. The port is one of the busiest in the world. The management of the docks, etc., is by a Port Trust, which has been active in adding to the facilities for shipping, and of late has constructed new docks at a cost of about \$10,000,000. The port extends 10 miles along the river and can always be reached by vessels drawing 26 feet. There are both wet and dry docks, the

largest of the latter having a depth of 25 feet at high water. The city was originally very unhealthy, but has been improved greatly by modern sanitation and drainage. The climate is hot and damp, but there is a pleasant cold season from November to March. The monsoon months, from June to October, are characterized by damp heat and malaria. The annual rainfall is 65 inches. The mean temperature ranges from 85° in the hot season to 72° in the cool season, with a mean maximum of 102° in May. Although the plague visited the city in 1899, trade was not demoralized by it; in 1901 it caused 7,884 deaths; in 1903-4, 8,223. Plague is no longer serious in the city. Of the total population in 1911 of 1,222,313, including suburbs, over 600,000 were Hindus, nearly 300,000 Mohammedans, and nearly 40,000 Christians.

Calcutta is especially noted for its enormous export business in jute products, its best customers being the United States and Australia; it does an extensive export trade in tea from Assam and in coal from the Bengal fields. It is also an important distributing center for all of India, especially for the northeastern portion of the Empire. The city also has important industries in flour and rice mills, iron foundries, tanneries, etc. Near Calcutta are the great Tata Iron and Steel Works, at a place called Sakchi, the Pittsburgh of India.

BOMBAY.

Bombay, often known as the gateway of India, is on the west coast. It is built upon the small island of Bombay, which is shaped much like Manhattan Island, N. Y. The chief industrial features are cotton textile mills, about 80 in number. Bombay has nearly 1,000,000 inhabitants; during the year 1900 it lost about one-tenth of its population through the plague, which is still prevalent, but no longer serious. The city does a large export trade in raw cotton, grain, seeds, cotton twist and yarn, condiments, myrobalans, goatskins, and manganese ore, and has an immense interior distributing business in merchandise of all sorts suitable to the country. It has gas and electric-lighting facilities and cheap power from a big hydroelectric plant near by. It has one hotel, the Taj Mahal, which is the largest in India, and many other fine buildings.

Through the greater part of the city the sanitation is bad and malaria is especially prevalent. A splendid work, however, is being done by the Bombay Improvement Trust, which is gradually improving conditions in the slum areas. The hottest months in Bombay are May and October. In June the southwest monsoon breaks and heavy rains continue until the end of September. There are not the great extremes of heat or cold found in the interior of India, but the climate is oppressive, owing to the moisture in the air. No city in the world has a greater variety of race types than Bombay. Besides the dominant element—the Mahratta race—there is an influential section of Parsi merchants, Arab traders from the Gulf, Afghans and Sikhs from northern India, Bengalis, Rajputs, Chinese, Japanese, Malays, Negroes, Tibetans, Singhalese, and Siamese. Among religions are the Hindu, Mohammedan, Parsi, Jain, and Christian. The Hindus constitute nearly two-thirds of the total, the Mohammedans one-fifth. Sixty-two different languages or dialects are said to be spoken within the city limits. Marathi and Gujarati are the most

widely used. English is spoken by many natives, especially in the Parsi merchant community. These Parsis hold high rank among the natives because of their wealth, intelligence, and natural bent for trade.

Over half of all the Parsis in India live in Bombay. A peculiar feature of this sect is the method practiced of disposing of their dead, which are deposited on the famous Towers of Silence in Bombay, where vultures come and dispose of them.

The shipping facilities at Bombay are in charge of a Port Trust. On March 21, 1914, the Viceroy of India formally opened to shipping the great new Alexandra Dock at Bombay, construction of which began in 1905. The area of this dock is $49\frac{1}{2}$ acres, while the depth is $37\frac{1}{2}$ feet at mean high water, thus placing it among the world's principal single docks. It is, however, only part of the large scheme which the Bombay port trustees are gradually bringing into operation by which the commercial facilities of the port will be enormously increased.

The trustees are also constructing a large railway receiving and sorting yard, in which cars from the Great Indian Peninsula and Bombay, Baroda, and Central India Railways will be received from up-country and distributed by the Port Trust Railway, also under construction, to their respective destinations in the several trade depots or the docks. By improving railway facilities in existing docks and by laying down suitable lines for serving all berths in the Alexandra Docks, the trade of Bombay, which is at present chiefly dealt with by the slow and expensive agency of the bullock cart, will be revolutionized.

The Hughes Dry Dock, attached to the Alexandra Dock, has been specially constructed to accommodate the largest battleship in the British Navy. The total expenditure on all these recent great works is estimated at about \$32,000,000.

The trustees are also constructing a communicating passage between the Alexandra and Victoria Docks which will provide four more 500-foot berths. In addition the harbor-wall frontage will extend for a length of nearly 6,000 feet, and will provide berths for vessels with a depth of water at mean of lowest ordinary spring tides of 28 feet. The port will, when these large extensions are completed, be capable of accommodating three times the tonnage for which berths were lately available. The new dock will enable passengers to step from mail steamers directly into trains to proceed to the farthest corners of India, while the postal department is provided with a large sorting shed where mails can be expeditiously sorted on arrival.

MADRAS.

Madras, population 578,660, is the third city of India in size, and the leading commercial center of southern India. It is located on a sandy shore without any natural harbor, but which, owing to extensive improvements that have been effected, now affords excellent facilities for shipping. Many public offices and warehouses line the beach, along which there is an attractive driveway for many miles. The business district of the city is scattered over a great area and it takes considerable time to go from place to place. Large parks and military

drill grounds are scattered through the city. The leading hotels and some of the leading shops are located near the outskirts. The chief industries comprise cotton manufactures, cement works, iron foundries, aluminum goods manufactures, and cigar factories. The city is the capital of the Madras Presidency, but during the summer the greater part of the Government work is transacted at the summer capital, Ootacamund, an attractive hill station near the Native State of Mysore. Madras is also an important center for religious missionary work, and contains a large cathedral and many churches, as well as a university and important schools. It may be mentioned that one of the first governors of Madras was Elihu Yale, who founded Yale University in New Haven, Conn., in 1702. The chief trade of Madras is in cotton, tobacco, skins, drugs, and spices, which are exported from here, and in a variety of articles required for the inhabitants of southern India. The city has good direct railway service to Bombay and Calcutta and to the island of Ceylon by the new ferry across the straits. The Peninsular & Oriental Steamship Co. provides free transportation across India to Bombay for those sailing from that port to Europe. The British East India Co.'s steamers sail periodically from Madras south and west to Bombay and north and east to Calcutta, and across the Bay of Bengal to Rangoon and beyond the Straits Settlements.

The mean temperature of December and January is 76°, but the summer heat does not approach that of northern India, the mean being only 90°. The annual rainfall is moderate, compared with some portions of India, averaging about 50 inches. Sanitation through the city is still defective and considerable malaria prevails, but plague has never been as serious a menace to this city as to Bombay and Calcutta. In some respects Madras appears to be a very up-to-date city, especially as regards its many attractive buildings and splendid roads and parks; in other respects, especially in the native quarters, it presents a primitive aspect.

KARACHI.

Karachi, population 152,000, on the Arabian Sea, is the chief port of northwestern India and in its trade is rapidly becoming a rival of Bombay. It is chiefly noted as being the principal export center for Indian wheat and barley. The grain trade is the chief commercial interest of the city. The recent rapid opening of vast new areas of land in the Punjab and in the Province of Sind by irrigation is tending to greatly increase the commercial importance of Karachi. Immediately back of Karachi is the Sind Desert, crossed by the Northwestern Railway, which taps for the benefit of Karachi's export and import trade the great agricultural districts of the Punjab. This railway also has a branch line into Baluchistan and to the Afghanistan frontier near Kandahar, so that all of Baluchistan and Afghanistan is tributary in large measure to Karachi commercially. The city is rapidly growing and in many respects would remind the visitor of some thriving western town in the United States. There are no elevators in Karachi for the storage of grain, which is allowed to lie in bags without cover in the open air; but, as the climate is dry and rain is rare, the grain stands such treatment very well. The city also does a big export business in raw cotton, hides and skins, and wool, and

an import business in cotton piece goods, twist and yarn, woolen manufactures, hardware and cutlery, wines and liquors, spirits, metals, provisions, sugar, machinery and metal work, and mineral oil, as well as various other articles required for northwestern India and frontier Provinces. A peculiar feature of Karachi is the use of camels for drawing wagons through the streets and for transport to localities in the Sind Desert. The average annual rainfall is only about 5 inches. November to March are cool and dry months. The mean temperature of January is 65°, of June, 87°. Included in the population are 60,000 Mohammedans, 48,000 Hindus, 6,000 Christians, and 1,800 Parsis. Large sums of money are being constantly expended upon improvements in docks and in local building construction. The city is the capital of the large district of Sind, embracing the valley of the Indus River, but is under general jurisdiction of the Government at Bombay, which appoints a deputy commissioner to look after the affairs of the district.

SIMLA.

Simla, population 19,000 in winter and about double that in summer, is the summer capital of the Empire of India, and for seven months of the year contains not only a large number of officials connected with the Indian Government but numbers of people who temporarily reside there because of the cool summer climate. It is located in the Himalaya Mountains about 8,000 feet above sea level, and is reached by a narrow-gauge railway from the town of Kalka, in the plains just at the foot of the mountains. It is not only the summer headquarters of all of the departments of the Indian Government, but considerable of the Government routine work is carried on here all the year round. It is the favorite city in India for tourists in the summer time, who find relief here from the intense heat of the plains. It is socially, in the summer time, the most brilliant city of southern Asia. Germany, Austria, Russia, Japan, and Persia maintain consular offices here in season.

In the winter, December to February, the mean temperature ranges from 39° to 44°. From March to June it ranges from 51° to 68°.

The railways of India are under the control of the Railway Board here. It is also an important military station and the headquarters of the commander in chief of the Indian Army. The city is built on a crescent-shaped mountain slope, and, owing to the narrow streets, carriages or motor cars are impossible, rickshaws furnishing means for local transportation. The most imposing building is the Vice Regal Lodge, located on a high eminence, the residence of the Viceroy. The European population of Simla is probably the largest, relatively, of any town in India. The city is now supplied with electricity from water power near by, and, as stated in a further article in this book, offers a good market for electrical supplies. It now has an automatic telephone exchange and a long-distance telephone to Delhi, the winter capital. A fine new town hall is shortly to be erected.

CAWNPORE.

Cawnpore, population 178,557, is the leading industrial center of India and has great factories for the production of leather goods, cotton and woolen goods, and tents. Boots and shoes, woolen goods,

cotton goods, and tents are manufactured here not only for use throughout India, but also for export to other countries. The city also has flour mills, iron foundries, chemical works, and establishments for making jewelry, woodwork, cutlery, etc. It is favored industrially on account of the large number of people here belonging to the Chamar caste, which does not object, like many other castes, to certain industries, such as leather or handling the skins of dead animals, which most castes object to on religious principles. The city has especially interesting historical connections, having been the scene of a great massacre of British residents at the time of the Indian mutiny. Except for its industrial importance and historical associations, Cawnpore contains little to interest visitors, and it is noted for its poor hotels. It has excellent railway connections with other parts of India and is a very important distributing center for the United Provinces. It is located on the Ganges and is only 43 miles from Lucknow, the capital of the United Provinces, also noted for its Indian mutiny associations. The climate of Cawnpore is hot and dry but fairly healthful.

DELHI.

Delhi, population 232,837, once the capital of the great Mogul Empire and now the capital of the modern British Indian Empire, is situated nearly due north of the southern point of India on the great northern plain of the Ganges, much nearer the Himalayas than the sea. This city is the chief distributing center for the districts between Calcutta and Bombay and is noted for some of its native industries, the manufacture of jewelry, lacework, silversmith's work, brass and copper work, ivory carving, pottery, weaving, and gold and silver embroidery. It also has some modern cotton spinning and weaving mills and flour and sugar-cane mills. The historical and architectural attractions and the interesting shops and good hotels make it a favorite city for tourists. It is also an important educational center. It contains a mosque, which is the largest in the world. The population includes 114,000 Hindus, 88,000 Mohammedans, 3,000 Jains, and 2,000 Christians. The city is 718 feet above sea level and has a mean temperature of 93° in July and 59° in January.

The great construction works which are now being undertaken in the city in connection with the new capital of India are described elsewhere in this book.

LAHORE.

Lahore, population 228,687, is the capital of the Punjab Province, as well as its chief distributing center. It is located on the great plain between the Ganges and the Indus Rivers in northern India. The rapid agricultural development of the Punjab in recent years, on account of new irrigation works, has proved greatly to the trade advantage of this city. It is an important center for trade in agricultural implements and other articles required for the use of a prosperous agricultural country. The city is of interest to tourists on account of its handsome mosques and temples. Local industries include manufacture of silk goods, embroidered shawls, lacquered ware, vegetable oil, soap, sulphuric and nitric acid, cotton fabrics, furniture, printing and bookbinding establishments, etc. The city has only about 20 inches of annual rainfall. In the surrounding

country agriculture is carried on by irrigation. The mean temperature in June is about 92° and in January about 50°. In midsummer the thermometer sometimes rises to 115° in the shade and even 105° throughout the night. In winter it falls sometimes as low as 20°. Included in the population are 113,253 Mohammedans, 62,922 Hindus, and 4,199 Christians.

OTHER IMPORTANT CITIES.

LUCKNOW, population 259,798, including 154,167 Hindus, 101,556 Mohammedans, and 7,247 Christians, is the capital of the United Provinces and famous historically for the great siege during the Indian mutiny. It is located on the Ganges, and is a distributing center for the fertile and rich region of the surrounding plain. Its chief industries include manufacture of such articles as gold and silver brocade, fine muslin, glasswork, cotton fabrics of all grades, paper, perfumes, etc. It is a popular city for tourists, having many interesting mosques and other handsome buildings and good hotels. Important railway shops are located here. It is also an important educational center. The mean temperature in June is 92° and in January 61°.

AMRITSAR, population 152,756, is an important commercial city of the Punjab, about 30 miles east of Lahore. It has interesting artistic industries of brasswork, ivory and wood carving, and also important manufactures of shawls, silks, woolen and cotton cloths, and carpets. There is quite a large export to the United States of Amritsar carpets.

ALLAHABAD, population 171,697, is located on the Ganges in northern India. Printing is the most important industry. The city is noted for its publications of various sorts, especially the Pioneer, which is considered a semiofficial organ of the Government of India, and which, with possibly one or two exceptions, has the largest circulation of any newspaper in India published in English. Every year during December and January a great religious fair is held in Allahabad, which is attended by 250,000 people.

AGRA, population 185,449, in the United Provinces on the Jumna River, 110 miles southeast of Delhi, contains one of the most famous architectural masterpieces of the world, the Taj Mahal, which makes it the chief tourist center of India. Commercially it has a fair importance as a distributing center for the populous region roundabout. Agra was long famous for its native arts and manufactures, such as gold and silver wiredrawing, embroidery, silk weaving and calico printing, pipestems, shoes, carving and inlaying of marble, and other stonework. Many of these industries have declined because of a growing preference for European manufactures. Cotton goods, carpets, and flour are manufactured here. The principal crops of the surrounding district are millet, pulses, barley, wheat, cotton, and a little indigo. There are excellent hotels.

BENARES, population 203,604, in the United Provinces, is located on the Ganges River, 390 miles northwest of Calcutta. It is the great holy city of India and the chief center of Brahmanical learning. Enormous numbers of wealthy pilgrims come here every year to

bathe in and drink of the waters of the "Holy Mother Ganges." Many die here and have their ashes thrown into the river. The city is described elsewhere in this book.

JAIPUR, population 137,098, capital of the Native State of the same name, is the chief commercial center of Rajputana. Its principal industries are dyeing, carving in marble, enameling on gold, pottery, and brass work, also manufactures of carpets and cotton rugs. About 70 per cent of the people are Hindus, 25 per cent Mohammedans, and 5 per cent Jains.

BAREILLY, population 129,462, is located in the United Provinces, near the Ganges, 146 miles northwest of Cawnpore. The chief industries are sugar refining, and the manufacture of furniture and brass vessels.

POONA, population 158,856, the seat of government of Bombay Presidency from July to November, is located 1,850 feet above sea level, about 119 miles southeast of Bombay. It is much frequented by visitors from Bombay owing to its cooler and more healthful climate, and its being reasonably dry during the monsoon period, the high hills shutting off to a great extent the rain clouds. There is an important Government agricultural school here and a depot for the sale of implements. There is considerable dairying and agriculture in the adjoining regions, the chief crops being grains, oilseeds, sugar cane, vegetables, and fruit, but irrigation is required. It has a few local industries, including cotton, paper, and flour mills.

BANGALORE, population 189,485, is the seat of government of the progressive State of Mysore in southern India. It is 219 miles by rail from Madras and 692 miles from Bombay. As a manufacturing town it is noted for its carpets, cotton and woolen manufactures, and tanneries. The city receives electric light and power from the famous Cauvery Falls, and has a tramway, most of the material for which was purchased in the United States. A large section of the city, known as the "cantonment," is under direct British authority, and contains important military barracks, etc. It is the chief military station of southern India and usually has a garrison of about 10,000 British troops. The Director of Commerce and Industries of the Mysore Government, Mr. Alfred Chatterton, who is the most noted commercial and industrial expert in India, resides at Bangalore. The mean temperature in May is 80° and in January 69°. On account of its reasonably cool climate in summer it is largely frequented during this time by visitors from Madras and other hot cities of India.

BARODA, population 99,345, capital of the progressive Native State of Baroda, is situated not far from the western coast of India on the railway from Bombay to Ahmedabad, 245 miles from the former and 42 miles from the latter. It is noted for its palaces, temples, and important Government buildings, library and collections of art, tapestries, gems, etc. (See further description in account of State of Baroda elsewhere in this book.)

MADURA, population 134,130, is located in the extreme southern part of India, 345 miles south of Madras. It is frequented by tourists on account of its interesting temples, but is not of much commercial importance. Its chief industries are weaving of silk, cotton, and

mixed fabrics, and manufacture of dyes. It is an important American missionary center.

HYDERABAD, population 500,623, is the capital of the Native State of the same name, and located on the plateau of Dekkan. Its trade is described elsewhere in connection with Hyderabad State. The city has long been the stronghold of Mohammedanism in southern India. The greater portion of the people are Hindus, but the reigning family is Mohammedan. About 8 miles from Hyderabad is the cantonment of Secunderabad, where British troops are stationed and where most of the European merchants live.

GWALIOR, population 46,952, capital of the Native State of Gwalior, is on the railway route between Bombay and Delhi. It is described elsewhere in connection with Gwalior State.

DACCA, population 108,551, is an important city in eastern Bengal, 150 miles northeast of Calcutta, located on a former course of the River Ganges. It is in the center of the jute district. It has other industries, such as weaving, shell carving, and boat building.

DARJEELING, population 23,852, located in northern Bengal in the Himalaya Mountains, has an elevation of about 8,000 feet, and is reached by a narrow-gauge railway. It is the summer capital of Bengal, and is greatly frequented in summer by visitors, who come here for its temperate climate and magnificent mountain scenery. Some of the loftiest mountains of the world are visible from here, including Mount Everest. Darjeeling is on a trade route into Tibet, and is also a distributing center to numerous tea plantations in the surrounding country.

PATNA, population 136,153, on the Ganges in the Province of Bengal, has some important industries such as the manufacture of rose attar, metal wares, soap, tablecloths, carpets, brocades, embroidery, pottery, brass work, dyes, fireworks, lac ornaments, gold and silver wire and leaf, glassware, boots and shoes. The principal crop of the surrounding country is rice. Next to Calcutta it is the most important commercial center of Bengal.

SRINAGAR, population 126,344, known as the "Venice of Asia," is the capital of Kashmir, and is located in the famous Vale, on the Jhelum River, which here forms some large lakes. These lakes together with artificial canals give the city its Venicelike aspect. A large part of the population live on the water, and many visitors who come here live in house boats during their stay. It is noted for its artistic industries, such as shawls, embroideries, woodwork, etc. The city is described elsewhere in this book in connection with the State of Kashmir.

RANGOON, population 293,316, is the capital of Burma, and is located about 21 miles from the mouth of the Irrawaddy River, on which is operated a line of river steamers to Mandalay. One-third of the population are Buddhist in religion. The industries are for the most part the preparation of the three principal exports, rice, timber, and oil. Carving in wood, ivory, gold, and silver is also carried on, gaining in commercial importance and h all the chief ports of India and with

MANDALAY, population 138,299, is the chief town of upper Burma, and is located on the Irrawaddy River, 386 miles north of Rangoon. It is noted for its Buddhist monasteries and various quaint attractions. There are many native industries, especially in wood carving and silverwork. The Irrawaddy Flotilla Co. runs steamers twice a week to Rangoon and there is also a railway to Rangoon. Large teak forests and rice fields are in the vicinity.

MAULMEIN, population 57,582, is the second largest city of Burma, and is situated on the east coast of the Bay of Bengal not far from Rangoon, the capital. The chief industries of the neighborhood are sawmills and the cultivation of rice. The rainfall is very heavy, amounting to nearly 190 inches annually.

CITIES IN CEYLON.

COLOMBO, population 226,969, is not only the capital of the island and entrepôt for most of the foreign trade, but is an important port of call for mail steamers between Europe, India, China, and Australia. It is distant from London by sea 6,703 miles and from Calcutta 1,380 miles. The city lies within seven degrees of the Equator. The city has one of the finest artificial harbors in the world, being accessible to the largest vessels, which, however, must load and unload by lighters. The city has a mixed population of Singhalese, Indians, and persons of Dutch and Portuguese descent, as well as many Europeans engaged in trade and Government service. The chief mode of conveyance about the city is by rickshaw, but motor cars are being increasingly used. Colombo does a large export trade in tea, rubber, coconut products, plumbago, cardamons, and various drugs, and a large import trade in cotton piece goods, plantation machinery, fertilizers, corrugated iron, hardware, tinned foods, motor cars, etc. Colombo is the headquarters of several hundred commercial houses and plantation companies. The great success which in recent years has attended the tea, rubber, and coconut industries has contributed greatly to the prosperity of Colombo. The city is very popular with travelers, and has several fine hotels and many attractive shops, especially for the sale of jewelry inset with Ceylon gems, ebony, ivory, laces, and embroideries. The mean temperature in January is 79° and in May 83°. The rainfall is 87 inches. Colombo is the distributing center not only for Ceylon, but also to some extent for the extreme southern part of India. It has close business connections and convenient railway and steamship arrangements with Madras.

KANDY, population 30,627, is near the center of Ceylon and 62 miles from Colombo. The railway between Kandy and Colombo is noted for its magnificent scenery. Kandy lies nearly 2,000 feet above sea level and is beautifully surrounded by hills, on the banks of a fine artificial lake. Three miles distant are the royal botanic gardens of Peradinya, in which are some of the oldest and most valuable collections of trees and plants in the world. It is expected that this will be the site of a tropical school of agriculture. An extremely prosperous tea district surrounds Kandy and located here is the headquarters of the Ceylon Planters' Association, a very influential organization. Many elephants are to be seen around Kandy, both at work and bathing in the streams. The city is much frequented by Budd-

hist pilgrims and is not very far from the famous Adams Peak, noted for its Buddha's footprint, as well as for the marvelous shadow it casts over the surrounding district. On account of its greater elevation, Kandy is much cooler than Colombo, the mean temperature being 71° in January and 76° in July. The rainfall is 85 inches.

ADEN.

Aden, population nearly 50,000, although in Arabia, is under the political jurisdiction of the Government of India. It is on a volcanic peninsula in the southern section of Arabia at the point where the Red Sea joins the Gulf of Aden and the Indian Ocean. The settlement altogether, including the small island of Perim a short distance away, includes about 80 square miles. Independent Arab tribes living within 100 miles from Aden are also under British protection. The port is designated as Steamer Point. There is an outer harbor offering good anchorage to a large number of vessels, while the inner harbor is dredged to a minimum depth of 30 feet. There are also two berths of 33 feet. Steamers anchor in the harbor and cargoes are loaded and discharged by means of lighters and small boats.

European and American goods are brought to Aden and reshipped to various parts of Arabia, to the Sudan, the adjacent French, English, and Italian colonies, to Abyssinia, and even to Bombay, the Persian Gulf, and Mombassa. Likewise many of the products of these territories are brought to Aden and reconsigned to countries abroad. Aden is one of the principal ports of call and coaling stations for ships running to the Far East, to East Africa, and Australia; moreover, it is a free port, and is conveniently located for the transshipment and distribution of merchandise. All the leading importing and exporting houses engaged in the Red Sea trade have their principal offices in Aden, with branches or agents in the more important parts of Arabia and the African colonies.

The United States ranks third in the imports and first in the exports at Aden. The imports are principally cotton goods and petroleum, and the exports are goatskins, coffee, ivory, and hides, in the order named. Up to two or three years ago the import trade of the United States was mainly confined to cotton goods and petroleum, but more recently American carriages, automobiles, and motor boats, hardware, tools, sewing machines, office furniture, and starch have been successfully introduced and the prospects are excellent for a considerable expansion in American trade here. The splendid reputation that American cotton sheetings enjoy in this district has undoubtedly had an influence in promoting trade in all lines and in creating a sentiment for other articles produced in the United States.

SANITATION.

The Government of India, through its Department of Education, has issued an important resolution on the subject of sanitary progress in this country, presenting suggestions as to the future policies to be followed in the interests of public comfort and health. The resolution lays down three broad principles on which sanitary work must proceed in India, as follows:

1. It must rest on a knowledge of the people, their conditions of life, their prejudices, social customs and habits, their surroundings and financial means; and it must secure their cooperation.
2. It must recognize the diversity of local conditions in a country which includes numerous communities, castes, and creeds, and which exhibits almost every variety of climate, temperature, humidity, and level of subsoil water, from the deltas of Bengal with their steamy atmosphere and dense lush vegetation to the burnt brown hills of the northwest frontier.
3. Its introduction must be preceded by preliminary local surveys, inquiry, or experiment.

The resolution states that it will be the policy of the Government of India to keep the control of research to itself, but to decentralize other branches of sanitation by intrusting them to the various local governments. It advises the local government to assume sanitary powers where these do not already exist, and to require municipalities to appoint health officers and to veto the appointments of unfit persons. Such powers, it is mentioned, already exist in the Bombay Presidency and in Bengal.

The problems of public health in India, it is said, are vitally complicated by the fact that biting insects are a prominent factor in the dissemination of disease, and it is obviously desirable to provide in India, as soon as possible, a complete course of training for sanitary officers.

SCIENTIFIC INVESTIGATIONS.

It is explained that the Government of India in 1911 financed the foundation of the Indian Research Fund Association, which has been very active and can already point to some achievement.

Investigations are in progress in connection with the prevalence of cholera, kalazar, dysentery, leprosy, and goiter, as well as inquiries into the pharmacology of cinchona derivatives, the use of hydrocyanic acid gas as a pulicide and the fixation of chemical standards of purity for milk and milk products. Other investigations are under consideration regarding bacteriological standards of purity for water supplies, the different anticholera vaccines and sera, the methods of water filtration and silt removal best suited to Indian conditions, and the etiology of diabetes and the fevers of short duration. These will be started so soon as more trained research workers are available.

ADMINISTRATION OF RESEARCH FUND ASSOCIATION.

The Indian Research Fund Association is controlled and managed by a governing body, the president of which is the head of the education department of the Government of India, and among the members of which may be mentioned the director general of the Indian Medical Service and the sanitary commissioner of the Government of India. This association has started the (quarterly) Indian Journal of Medical Research for the publication of medical research work done in India.

The most important tropical disease in India is malaria, which is universally prevalent, and causes more sickness and deaths than any other single disease. In many parts of the country it is a scourge worse than plague or cholera. The Government of India has arranged classes for instruction in practical malaria work twice a year. The Government recommends the abolition of mosquito-breeding grounds and also the use of quinine as both a prophylactic and a curative agency.

In 1905 a plague research commission was instituted to make investigations regarding plague. In general these investigations pointed to a simple solution of the plague problem—no rats, no plague. The resolution of the Government states, however:

This solution is not attainable unless the population concerned is convinced of the danger of living in close association with the rat and is ready to cooperate in its extermination. Unfortunately attempts at rat destruction by trapping or poison frequently meet with active opposition. Experience in India suggests that owing to the excessive fecundity of the animals, general rat destruction, even when applied to extensive areas, gives only a temporary reduction of rat infestation and has a limited sphere of usefulness as an antiplague measure.

In one direction, however, well directed efforts at rat destruction may prove useful. In each epidemic a number of places are infected late in the season, and in certain of these plague survives the nonepidemic period only to break out in a virulent form when the conditions of spread again become more favorable. These localities are potential foci of extensive infection. It would seem important to concentrate the energies of the plague preventive staff on them in well-organized schemes of rat destruction carried out during the quiescent period before the commencement of the next epidemic season.

Much can be done, indirectly, to reduce the number of rats in towns and villages by diminishing their food supply. In any place the number of rats is in proportion to the quantity of food which they can obtain. Efficient scavenging and the protection of foodstuffs from the depredations of rats are important from this point of view. The markets, grain stores, and shops, in most parts of India, are so placed and constructed as to give food and shelter to large numbers of rats. Experiments are being carried out with a view to discovering the best practical means of disinfecting grain stores and godowns. It is not practicable at present to remove grain markets and godowns outside towns, to prevent them from being used as dwellings for men, to insist on solid masonry buildings, or to prohibit the stabling of horses and cattle in the precincts of dwelling houses. But these measures and the storage of grain in bulk instead of in bags may, with the progress of education, hereafter enter the zone of practicability. The exclusion of rats from houses is important. In several Provinces experiments with different types of so-called rat-proof houses have been made with varying degrees of success. The result suggests that no form of house could remain rat free for long in India owing to the habits of the people. Even if this were not the case it would obviously be impracticable for financial reasons to render dwelling houses in the towns and villages of India rat proof on anything like a large scale. On the other hand the individual can protect himself by providing his house with masonry floors and walls and windows enough to give ample light and air to every room and by preventing accumulations of rubbish among which rats can build their nests.

It was also recommended that on the occurrence of rat mortality or human plague cases all houses in or adjacent to such mortality centers should be temporarily evacuated and also disinfected; moreover,

that inoculation with antiplague vaccine should take place on a large scale, and all facilities should be afforded to those who wish to obtain such protection.

CHOLERA AND SMALLPOX.

It is stated that cholera is now much less prevalent than formerly, but frequently occasions severe epidemics and still remains a constant cause of mortality. Epidemics have in several recent cases been traced to pilgrims returning from places of religious pilgrimage, at which there had been no recognized outbreak of the disease. An investigation, which is still continuing, has established the fact that not only cholera convalescents but also healthy persons who have been in contact with cholera cases can act as carriers of the disease. It has also been shown that the germs of the disease can be recovered from a patient's dejecta kept under natural conditions for a variable but frequently considerable period, and that flies may play an important part in the dissemination of infection.

It is remarked that smallpox now occupies a small place in the mortality returns, due to the spread of vaccination. Formerly nearly all vaccination was effected by human lymph, but within recent years arm to arm vaccination has been steadily replaced by the use of pure glycerinated or lanolinated calf lymph. The change does away with the necessity of breaking the vesicle in the child's arm, a simple operation but one which exposes the wound to contamination by extraneous germs, and it insures that the vaccination is effected with a pure and fully potent lymph with consequent increase of protection.

TUBERCULOSIS—DISPOSAL OF GARBAGE.

In some of the large cities of India the mortality in tuberculosis exceeds that of certain crowded European cities. Recent research appears to show that tuberculosis in India is chiefly human and not bovine in origin. Indian cattle, so far as is known, are practically free from the disease, and Indians do not as a rule drink unboiled milk. The source of the disease is in the homes of the people, and the relief of congested areas and the provision of sufficient light and air in human tenements are preventive measures of great value.

It is explained that the importance of efficient scavenging with speedy and complete removal of all night soil and rubbish from the vicinity of habitations and its satisfactory disposal can scarcely be exaggerated. Yet probably no department of public health work is more neglected in many Indian towns. The strict rules of the caste system have for centuries relegated everything connected with this work to the outcast. To such neglect is attributed the plague of flies which at certain seasons is experienced in every Indian town.

The Government of India recommends that with the extension of drainage and sewerage systems there should be water carriage of all night soil, with ultimate disposal on sewage farms. However, in the majority of towns it may be long before this is generally practicable, and the choice rests between incineration and trenching, and of these two methods the former is safer and preferable.

IMPROVEMENT TRUSTS.

One of the most important features connected with the present development of India is the zealous attention paid in some of the larger cities to providing broader streets and more sanitary buildings, so as to open up to the wholesome influences of sun and air various congested areas, where the most squalid and unwholesome conditions have hitherto prevailed. Already some such highly beneficial improvements have been carried out in Bombay, Calcutta, and on a smaller scale in some other large towns, notably in the United Provinces, especially at Lucknow, the capital.

The pressing need of reforms in congested districts, especially in view of the immense mortality from plague and malaria,¹ which thrive on insanitary surroundings, has originated and given great scope to special civic organizations, known as improvement trusts. The leading examples of these are to be found at Bombay and Calcutta. Important schemes for the betterment of conditions in these two cities are now being carried out by such improvement trusts co-operating with the local municipal governments and with the Government of India.

IMPROVEMENT TRUST WORK.

Improvement trust work in India was first inaugurated in 1898, by the creation in Bombay of the City of Bombay Improvement Trust. Up to the present time this trust has incurred expenditures amounting to about \$16,000,000 toward schemes which will aggregate in total expenditure over \$26,000,000. Broad roads have already been driven through the heart of Bombay, many slum areas noted for plague mortality have been abolished and their inhabitants provided with better dwellings elsewhere, and in other parts of the city improvements have been made in particularly bad tenement dwellings.

In Calcutta there was instituted by the Government in 1912 the Calcutta Improvement Trust, an organization similar to that at Bombay. The preamble of the act by which this trust was founded describes its objects as follows:

Whereas it is expedient to make provision for the improvement and expansion of Calcutta by opening up congested areas, laying out or altering streets, providing open spaces for purposes of ventilation or recreation, demolishing or constructing buildings, acquiring land for the said purposes, and for the rehousing of persons of the poorer and working classes displaced by the execution of improvement schemes.

FUNDS FOR THE IMPROVEMENT WORK.

The funds for the great projects being carried out in Bombay and in Calcutta by these improvement trusts are provided mainly from local taxation and municipal contributions, supplemented for each city by an Imperial grant amounting to \$1,619,998 and in Calcutta by a recurring grant of \$48,866 for 60 years. In Bombay the work of the improvement trust has to a great extent been self-supporting,

¹ Deaths from plague in Bombay city amounted during the period between 1896 and 1912, inclusive, to 178,434, equal to nearly one-fifth the present population of the city.

Malaria, often known merely as fever, is the most common of all dangerous diseases in Bombay, but the mortality, though very heavy indeed, is not definitely known, especially as this disease is often complicated with other diseases. There are seven varieties of anopheline or malarial mosquitoes in Bombay.

and the funds for continued projects of a beneficial nature have been raised largely through profits on enhanced value of land sold or leased by the trust after improvements have been effected over squalid conditions previously prevailing. For instance, the building in which is located the American consulate at Bombay is on land which had been redeemed by the trust from an especially plague-stricken slum area of the city. Of course, after such material improvements have been effected such land becomes much more valuable for purposes of business and of residence, and the whole district receives a substantial boom. A good deal of the trust's work, however, is done at no profit or at some loss, but must be considered from the standpoint of its economic advantages.

Of the 1,000,000 people of Bombay, 76 per cent live in one-room tenements. The city is on an island (somewhat the shape of Manhattan Island, on which New York City is located), and this island is 12 miles long, but is very narrow and contains only 22 square miles. The greater part of the population (in the native quarters near the middle of the island) live on only about one-half of the island. Next to London, Glasgow, and Calcutta, Bombay has the largest population of any city in the British Empire, and parts of Bombay have a larger population to the acre than is found anywhere else in the British Empire. Although the average population per acre in Bombay is 67, yet in some districts it is as high as 638.

OVERCROWDED ONE-ROOM TENEMENTS.

According to the last official census of Bombay (1911) there were 166,337 occupied one-room tenements, giving an average of 4.47 persons per room. Many of the rooms are occupied by more than one family. The rent of these rooms is from about \$1 to \$1.65 per month, while the average monthly wages of the class of people who live in them is about \$6.60.

The tenement buildings in some instances have their rooms constructed like the steerage quarters of a ship, with bunks one over another. Bedrooms and kitchens are sometimes combined. Between the buildings are narrow passageways into which all manner of refuse is thrown by the tenants, and which are used for drainage purposes. The pools of stagnant water in these passageways are breeding places for malarial mosquitoes. The task of preventing undue accumulation of filth in such places is intrusted to coolie women, who carry away the refuse in baskets on their heads.¹

¹ A description of slum tenements in Bombay appears as follows in the recent book on Sanitation in India, by Dr. J. A. Turner, executive health officer of the Bombay municipality:

"The houses are built almost back to back, there being only a narrow passage between the row of houses in one street and that in the next. The depth of houses from front to back is excessive, and usually the whole of the available space behind the street frontage is occupied by the building itself. The privies in many cases are not properly detached, and the air of the dwelling is continually charged with the most noisome odors. There is rarely a gully at the sides of the houses, and when one exists it is generally not more than 2 feet in width. As a result of this the buildings as a whole are deficient in light and ventilation, the center rooms being often in absolute darkness and dependent for ventilation upon the passages within the houses. Speaking generally, the gullies are open channels for carrying off suffage, but usually they are so imperfectly paved as not to be water-tight, and sometimes they are not laid with a proper fall toward the street drain. Many of them serve as passages for sweepers and are flanked on either side by a long row of privy shafts. In such cases the trapdoors of the shafts abut immediately on the gully, and when the receptacles get full and overflow, as they frequently do, the liquid filth is discharged on the surface of the gully. Refuse of all kinds is also thrown into the gullies by the people living in the adjoining houses. For these reasons the gullies, though repeatedly cleansed, are generally in a dirty and foul condition, and windows which overlook them have to be kept closed to exclude the smell. Such gullies are therefore of little use for purposes of ventilation. Moreover, owing to the structural defects pointed out above, liquid filth is not carried away, but stagnates in the gullies, and the foundations of the houses and the soil around them continually receive what to all intents and purposes is the soakage of sewage. In this way the soil and subsoil are fouled and rendered damp and the level of the ground water is raised. As a result, dampness of ground floors is a noticeable feature in nearly all the houses, even in those with substantial plinths and paved or cemented floors."

IMPROVEMENT MUST BE GRADUAL.

That these dwellings are unfit for human habitation is well recognized by the municipal authorities and health officials of Bombay, but to remedy such shocking evils involves very serious problems, the solution of which must necessarily be a case of making haste slowly, for if these tenements were to be destroyed at once the great majority of the people of Bombay would be left entirely homeless. Moreover, the wage-earning power of the residents is so small that improved accommodation which would involve any material increase of rent would only cause increased hardship. Further, no good would be accomplished if these people were moved from present insanitary tenements only to change their residence and introduce their squalid conditions of living into the better parts of Bombay.

SANITATION SCHEME IN BOMBAY.

The work of the Bombay Improvement Trust, so far as it has now progressed or is planned, may be divided into two parts. The first concerns the immediate alleviation of the worst burdens of insanitation and the second consists of opening up new residential areas. The trust began by attacking the most insanitary areas. Two broad roads, running due east and west, were cut through the worst parts of the city, sweeping away a mass of insanitary property and admitting the healthful westerly breezes to the most crowded parts of it. These thoroughfares are known as Sandhurst Road and Princess Street. They are as yet hardly completed, but the greater parts of them are already settled under the new conditions, with sites on both sides of them disposed of on long leases and many new buildings erected and occupied. Meanwhile large areas of good building land, lying idle for lack of development works, have been developed and brought on the market. Two of the most insanitary quarters in the midst of the city have been leveled to the ground and rebuilt in accordance with hygienic principles. Sanitary "chawls,"¹ or tenements, have been built for nearly 20,000 persons.

DEVELOPMENT OF A NEW SUBURBAN SECTION IN BOMBAY.

The second class of work, arising gradually out of the first already explained, consists of the development of a new suburban area in the north of the island, beyond the present city, and the construction of great arterial thoroughfares traversing the island from north to south. The latter undertakings were originally known as the Eastern and Western avenue schemes, but the cost of land is rising so rapidly throughout the city, and the expense of new works is accordingly growing so heavy, that the Western avenue has had to be practically abandoned and modified improvements of existing highways from south to north, on the western side of the city, substituted for it. In the northeast portion of the island of Bombay, extending some 3 miles, and consisting until recently of swampy rice lands interspersed with jungle and small hills, a whole area has been acquired by the trust. Some of the hills have been leveled and the material

¹ A "chawl" in India means a building so constructed as to be suitable for letting in separate tenements each consisting of a single room or of two rooms, but not of more than two rooms.

from them used to fill the low-lying parts of the estate. The trust is now devoting its attention to facilitating private enterprise in building here. This suburb will probably become largely residential for people whose daily pursuits take them to the southern city, but its chief use will be for those whose vocations employ them in the large new port extension which the Bombay Port Trust is carrying out at the north of the present port and where the new cotton green and grain yards will be situated. The Bombay Port Trust has reclaimed 596 acres of land from the north of the harbor, at a cost of over \$9,000,000, and the whole of the export trade of Bombay will eventually be concentrated near this new area or on it.

WORKMEN'S NEW CHAWLS.

The new "chawls" or workmen's tenements erected by the trust are of the style which it is hoped will eventually provide accommodation for all of Bombay's working classes. Reinforced concrete and iron fittings are used in their construction. While the plan of the new "chawls" is as simple and cheap as possible, and would hardly satisfy the tastes of an American workingman, yet generally speaking these new dwellings, as regards light, ventilation, and sanitation, are an immense improvement over the old customary dwellings of the working classes of Bombay. The roofs of these "chawls" have walls about them and are easily accessible for those who wish recreation in fresh air and sunlight and for children to play on. There is no woodwork visible. It is said that if wooden material were used at all inside, it might be chopped up for purposes of fuel. As regards the water supply for these "chawls," it was found that if it was freely obtainable from the taps enormous waste resulted, which could be ill afforded in Bombay with its limited water supply during the greater part of the year. At first it was so arranged that water could be drawn only as a lever was pressed down, but it was found that residents would tie weights to the lever so that the water kept continually flowing; consequently to meet this difficulty a device was invented whereby at any one time only sufficient water can flow to fill a good-sized pail or native vessel.

Generally speaking, the new dwellings provided by the Bombay Improvement Trust follow the rule that throughout the length of one side of every living room there shall be external air space open to the sky extending to a distance, measured horizontally from the room wall, of at least half the height of the top of the opposite house above the floor of the room. This is called the "63½° rule," because the angle at which light from the minimum air space so prescribed will strike the floor is an angle of approximately $63\frac{1}{2}^{\circ}$, which has a tangent of 2 to 1. Thus if a gully between two houses is only 10 feet broad the height of each house above the plinth must be limited to 20 feet, if the lowest rooms are to satisfy the $63\frac{1}{2}^{\circ}$ rule; and if two houses of the maximum height ordinarily allowed in Bombay, viz., 70 feet, are built side by side and have side rooms depending upon the space between the houses for their light and ventilation, then, to satisfy the $63\frac{1}{2}^{\circ}$ rule, that space must be 35 feet broad. This rule is also now enforced under municipal by-laws all over Calcutta.

Special Consular Reports, No. 72.

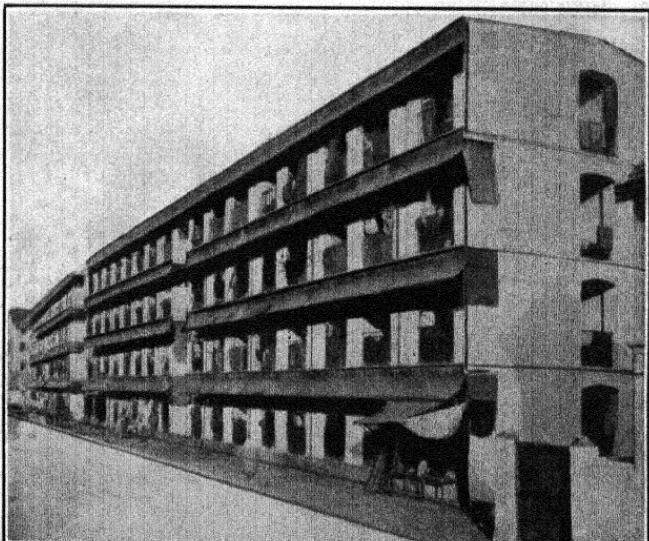
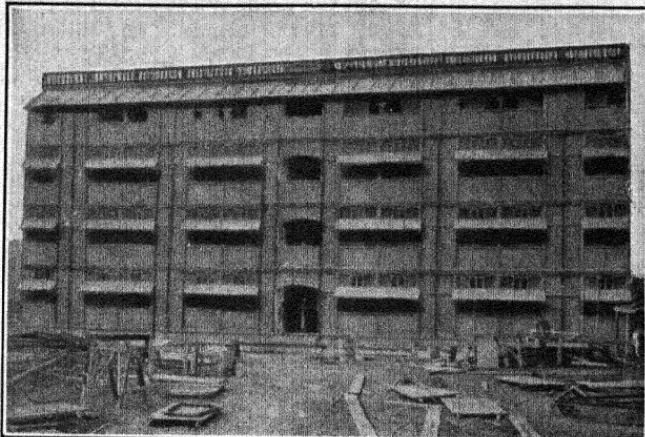


FIG. 3.—REINFORCED CONCRETE "CHAWLS" OR TENEMENTS ERECTED BY BOMBAY IMPROVEMENT TRUST.

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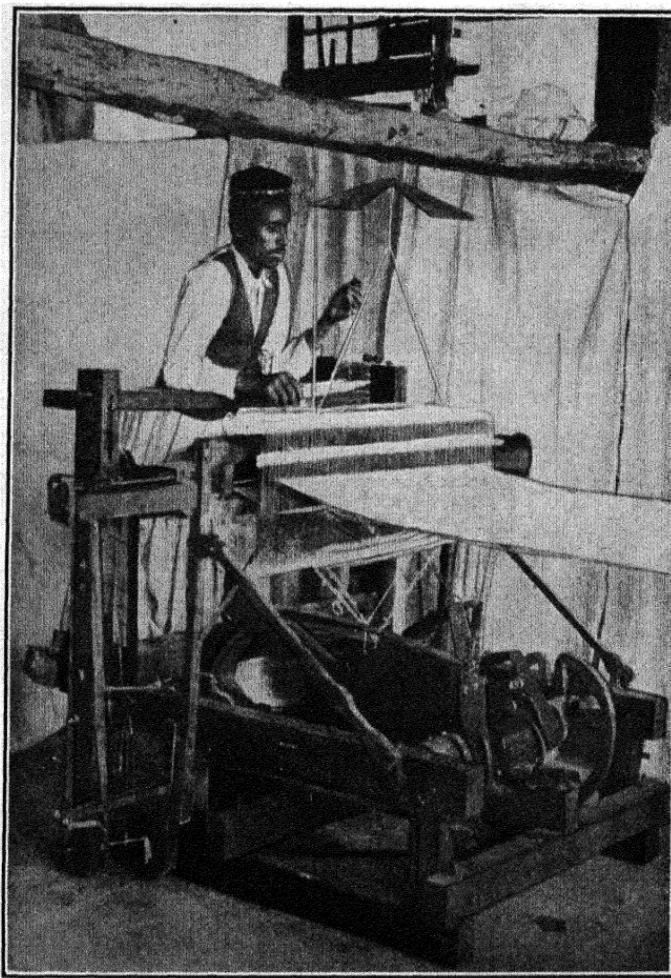


FIG. 4.—HAND LOOM DEVISED BY AMERICAN MISSIONARY.

SIMILAR WORK IN CALCUTTA.

The Calcutta Improvement Trust, which was organized in 1912, has not yet had time to produce results which can compare at all with the important accomplishments at Bombay, but its work is most promising for the future. The work upon which it has embarked may be divided into three classes, as follows:

1. Many parts of Calcutta are overcrowded with buildings and ill provided with roads. These areas are to be rearranged both on the ground of sanitation and for convenience of traffic.

2. Population will continue to throng into the overcrowded parts unless it can live on the outskirts and at the same time have speedy access to the business centers of the town. Quick traffic can only take place along broad roads. These are almost entirely lacking in Calcutta. The construction of broad roads will at the same time ventilate the overcrowded parts of the town, and it has been recognized from the outset that the construction of broad roads running both north and south and east and west will thus secure a double object.

3. There is the question of providing for the population displaced by improvements and, still more important, of providing for the natural growth of population by laying out roads and building sites in sparsely populated areas on the outskirts of the town. When persons of the working class are displaced or likely to be displaced the trust will build dwellings for them if private enterprise does not undertake the work.

The buildings designed for the Calcutta Improvement Trust resemble those erected by the Bombay Improvement Trust. Three blocks of model dwellings have already been erected and, it is said, are quite popular with those who have moved into them, so that they may prove an incentive to private builders to erect dwellings of a similar style in the growing suburbs of Calcutta. All flooring and roofing are of the expanded metal system of reinforced concrete construction. The floors are designed to carry a live load of 75 pounds per square foot over 6-foot spans and are 3 inches thick with concrete in the proportions of 1: 2: 4, the expanded metal reinforcement consisting of No. 15 metal, 3-inch mesh, $\frac{1}{8}$ -inch strands, imported from the United States.

SUBURBAN MOVEMENT OF THE BETTER CLASSES.

There is an increasing desire of well-to-do people in Indian cities to escape from insanitary surroundings and to obtain houses in more open positions outside of city limits. In Bombay, a cooperative housing association has been organized under the auspices of the Bombay Improvement Trust. The idea of this new organization is that tenants having mutual sympathies by reason of employment in the same office or factory or because of belonging to the same community could combine for the purpose of raising capital to provide for housing conditions in keeping with their incomes. The association will collect information about cooperative housing in other parts of the world and will maintain a library and arrange for lectures concerning the housing subject.

TOWN-PLANNING BILL FOR THE BOMBAY PRESIDENCY.

A town-planning bill has just been introduced by the Government of the Bombay Presidency to provide for the orderly development of Salsette, a near-by suburb of Bombay. It is the first attempt of its kind in India to legalize an organized town planning in new

residential areas, so it is an experiment that will be watched with great interest. The object of the bill is to secure a good development of large tracts of building land, and it will compel owners of many small intermingled holdings to cooperate so as to secure the development of the whole area of these combined holdings under the control of the local authority as if it belonged to a single owner. The bill has been officially approved by the Government of India, which, in a resolution concerning the same, explains that the principal feature is that the cost is apportioned among and recovered from the various persons and interests concerned in the shape of a development contribution calculated in proportion to the increased value which is estimated to accrue to each plot on the completion of the scheme. The tax that can be levied upon any one owner is limited, as in England, to one-half of the betterment estimated to accrue. The local body remains liable for any excess cost not covered by the tax. Such a scheme involves taking powers to pool and redistribute small holdings in a form suitable for building purposes. It has the advantage of reducing capital outlay while securing for public purposes a share in the profits of the transaction.

CHAMBERS OF COMMERCE.

Chambers of commerce are doing an important work in the commercial development of India. Since the modern commerce of India was built up by European merchants, it was natural that chambers of commerce and kindred associations should be formed in the first instance by them; but natives have in recent years taken a large and growing part in this commercial life. Arising from these circumstances are the chambers of commerce in Bombay, Karachi, Calcutta, Madras, and other important centers, with membership including both Europeans and natives; but alongside these have sprung up in recent years certain associations, such as the Bombay Indian Merchants' Chamber and Bureau, of which the membership is exclusively native. These different associations are in no sense hostile, but work in close association with one another.

A new movement was started in 1913 by a prominent native mill owner of Bombay which promises to lead to great improvement in strengthening Indian commercial organizations. This is a plan for the formation of an Indian commercial congress which would meet once in every two or three years at different industrial centers and enable those who are concerned in commercial and industrial development in India to associate themselves in furtherance of a coordinated commercial policy. The first session of the congress has not yet been summoned.

In the same year the Indian Merchants' Chamber and Bureau in Bombay also proposed an Indian congress of commerce. The congress was to consist of delegates elected by different commercial bodies in India, an electorate of well-known commercial associations being formed in each Province. In this manner various parts of India were to be represented. All the native chambers of commerce and commercial associations approved the scheme. The European chambers also, with one exception, approved it, but expressed their inability to join. The committee decided to convene a Commercial Congress in November, 1914. Owing, however, to the war the committee subsequently postponed the holding of the congress.

The chambers of commerce existing in India, especially the Bengal Chamber of Commerce, Bombay Chamber of Commerce, Karachi Chamber of Commerce, Madras Chamber of Commerce, Burma Chamber of Commerce, Upper India Chamber of Commerce, Punjab Chamber of Commerce, and the Indian Merchants' Chamber and Bureau at Bombay, all possess considerable influence in commercial matters, and their opinions carry weight with local governments and with the Government of India. They undoubtedly are important factors in representing commercial sentiment and promoting interests of trade. It will be noticed from the foregoing that some of these chambers are given a direct voice in government by being entitled to representation in provincial and municipal legislative bodies and port trusts, and two of them are represented on the legislative council of the Viceroy of India.

BOMBAY.

There are now affiliated with the Bombay Chamber of Commerce the Bombay Mill Owners' Association and the Bombay Cotton Trade Association. Besides the usual regulations regarding local membership, it is provided that any stranger engaged or interested in mercantile pursuits and visiting the Presidency may be introduced as a visitor by any member of the chamber, inserting his name in a book to be kept for the purpose; but a residence of two months shall subject him to the rule for admission of members. A special department of the Bombay Chamber is its statistical department, which prepares a large amount of statistical returns connected with the trade of the port and is of great importance to the conduct of commerce. This comprises native clerks, who work in the customhouse and compile all the statistical information in connection with the trade of the port. No other chamber in India does similar work.

The Bombay Chamber publishes a Daily Arrival Return and a Daily Trade Return, which show the receipts of various imports; also detailed reports twice a week known as Import and Export Manifestations and three monthly statements, one showing the exports of leading articles from all the principal ports; another showing imports, particularly in regard to piece goods of all descriptions, metals, kerosene, and the like; another showing "Movements of Piece Goods by Rail" to centers of trade in the interior. "Current Quotations" are issued once a week, a "Weekly Return" is made, and the annual reports issued by the chamber are substantial volumes, in which the trade of the port during the year is reviewed.

Associated with the native Merchants' Chamber of Commerce directly or indirectly are the Bombay Native Piece Goods Merchants' Association, the Grain Merchants' Association, and the Hindustani Native Merchants' Association. The chamber publishes every month a journal in the Gujarati language.

CALCUTTA.

At Calcutta is located the Bengal Chamber of Commerce. Other associations connected with the trade and commerce of the city are the Royal Exchange, the Bengal Bonded Warehouse Association, the Calcutta Trades Association, and the Bengal National Chamber of Commerce. The Bengal Chamber of Commerce maintains a tribunal of arbitration for the determination, settlement, and adjustment of disputes relating to trade, business, and manufactures between parties who carry on business personally or by agent or otherwise in Calcutta or elsewhere in India. The following are the recognized associations of the Bengal Chamber of Commerce: Calcutta Wheat and Seed Trade Association; Indian Jute Mills Association; Indian Tea Association; Calcutta Tea Traders' Association; Calcutta Fire Insurance Agents' Association; Calcutta Import Trade Association; Calcutta Marine and Insurance Agents' Association; Wine, Spirit, and Beer Association of India; Indian Mining Association; Calcutta Baled Jute Association; Indian Paper Makers' Association; Indian Engineering Association; Jute Fabrics Shippers' Association; Calcutta Hydraulic Press Association; Jute Fabric Brokers' Association; and Baled Jute Shippers' Association.

KARACHI AND MADRAS.

The objects and duties of the Karachi Chamber of Commerce are similar to those of the Bombay Chamber. The Madras Chamber of Commerce issues the following publications: Madras Price Current and Market Report; Tonnage Schedule and Madras Landing Charges; and Harbor Duties Schedule. The Southern India Chamber of Commerce has its office in Madras. Its objects are similar to those of the other chambers and relate to the promotion of trade, especially in the Madras Presidency, and the interests of the members. Among its special objects are to maintain a library of books and publications of commercial interest and to establish museums of commercial products or organize exhibitions. Members of the Madras Chamber hold seats in the Madras Legislative Council, Port Trust, and Municipal Corporation.

OTHER CITIES.

Among similar chambers of commerce are the Upper India Chamber of Commerce, concerned with trade, commerce, and manufactures in the United Provinces and having its office at Cawnpore; the Punjab Chamber of Commerce, with headquarters at Delhi, which is concerned with mercantile interests in the Punjab, the Northwest Frontier Province, and Kashmir has affiliated branches at Lahore, Amritsar, Srinagar, and Rawalpindi; the Indian Chamber of Commerce for the United Provinces, organized in 1914 at Cawnpore; the Burma Chamber of Commerce, with headquarters at Rangoon, having the Rangoon Import Association and other bodies affiliated with it and electing members to several public bodies; and the Cocamada Chamber of Commerce, having its headquarters at Cocamada, the chief port on the Coromandel coast north of Madras.

PORT TRUSTS.

[By Vice Consul General John S. Hunt, Calcutta.]

The administration of the affairs of the larger ports in India is vested by law in bodies especially constituted for the purpose, called port trusts. These trusts exist in Calcutta, Bombay, Madras, Karachi, Rangoon, Chittagong, and Aden. They have wide powers, but their proceedings are subject to the control of the Government in a greater degree than those of municipal bodies. These trusts are charged with the provision of suitable dock accommodation and other necessary services to shipping.

A chairman is appointed by the Government, but a large proportion of the members represent the commercial communities interested in the port; these are (except in Aden, Arabia) elected by chambers of commerce or similar bodies. In Calcutta, Bombay, and Karachi the municipality is also represented. Except in Calcutta, the elected members are fewer in number than the nominated members. Non-official members outnumber official members at all the ports except Chittagong, where official members constitute a small majority. At all the ports the European members constitute the majority, the trust for Rangoon consisting wholly of European members.

REVENUES AND EXPENDITURES.

The revenues which the trusts administer are mainly derived from dues on shipping and goods and from fees for services rendered. The trusts are empowered to raise funds by loan to meet capital expenditure. The total income and expenditure of the six ports amounted to \$215,183,653 in 1912-13, against \$200,851,810 in 1911-12, of which 69 per cent stands against Calcutta and Bombay, this proportion corresponding fairly to the proportion of the maritime trade which centers in these two ports.

The income and expenditure for 1912-13 of each of the six port trusts in India are shown in the following table:

Ports.	Income.	Expenditure.
Chittagong.....	\$745,197	\$583,980
Calcutta.....	46,231,750	47,691,700
Bombay.....	29,458,547	25,662,677
Madras.....	5,418,037	5,807,357
Karachi.....	15,799,903	11,872,280
Rangoon.....	14,242,623	11,679,600

The percentage increase in income and expenditure of each port during the decade ended March 31, 1913, is shown in the following statement:

Ports.	Income.	Expenditure.
	<i>Per cent.</i>	<i>Per cent.</i>
Calcutta.....	78.9	91.5
Bombay.....	39.8	24.8
Madras.....	96.1	108.7
Karachi.....	139.8	139.7
Rangoon.....	158.5	140.3
Chittagong.....	71.9	122.3

FINANCIAL REVIEW OF PORTS.

Sir George Buchanan, chairman of the Rangoon Port Commissioners, has prepared the following review of the financial condition and working of the ports of Bombay, Karachi, Calcutta, and Rangoon for the year 1913-14:

BOMBAY.

The port of Bombay had another most satisfactory year, the ordinary revenue exceeding that of 1912-13, in itself a record year, by 9½ lakhs (\$316,322) and the budget estimate by 11½ per cent. The expenditure was slightly below the budget, the net surplus amounting to 16½ lakhs (\$535,315) and the revenue reserve at the end of the year stood at 89.90 lakhs (\$2,916,655) and at the beginning of 1914-15 at 106 lakhs (\$3,438,993). The tonnage of shipping and value of trade again heads the list of Indian ports.

The new Alexandra Dock was opened by the Viceroy on March 21, 1914, and will afford a great relief to existing congestion and provide a stimulus to the further growth of trade. At the opening ceremony some interesting figures were quoted showing that the tonnage of shipping and value of sea-borne trade had trebled in the last 40 years, while the Port Trust revenue had been quadrupled.

KARACHI.

In last year's review I pointed out that in a port so largely dependent for its prosperity on one trade, fluctuations might be expected. This is exemplified in the administration report, as through wheat shipments being less than last year by 700,000 tons (the total export tonnage being 1,483,069 as against 2,183,090 in 1912-13) the ordinary revenue dropped from 45.86 lakhs (\$1,487,851) to 42.4 lakhs (\$1,375,597), but owing to expenditure being less than the budget by 5½ per cent or 2.23 lakhs (\$72,348), combined with the fortunate sale of land to the Northwestern Railway, the accounts are able to show a surplus of 8.81 lakhs (\$285,826).

Karachi has so much in its favor, that is, a trade that must increase, a reserve fund of 35 lakhs (\$1,135,517), very small establishment charges, a moderate debt, and an inexpensive port to work, that temporary setbacks need cause no concern.

CALCUTTA.

Calcutta is again in the unfortunate position of having expended in the year more than was received. The revenue was the highest on record, amounting to 151.28 lakhs (\$4,989,784), or 3 per cent above the budget estimate, but the expenditure was also the highest on record, exceeding the budget estimates by 11 lakhs (\$356,877), or 7½ per cent, the estimate for repairs and maintenance exceeding the budget estimate by 40 per cent, or 5½ lakhs (\$186,549), the latter sum being approximately the deficit on the year's work.

During the year a public commission was appointed by the Government to examine the existing traffic and port facilities and investigate the present and future requirements of trade, and as a result of the inquiry a highly enlightening and interesting report was issued.

A comprehensive scheme of new works for the accommodation of trade has been approved and what is equally important, measures are being taken for the restoration of the equilibrium between income and expenditure.

In my note last year I remarked on the variation in the arrangement sanctioned for the raising of capital at the various ports and on the soundness of the policy of long-tenure loans for permanent works. The Calcutta proposals include the raising of further capital on loans repayable in 60 years and the charging of interest on the cost of major works to capital during the period of construction.

RANGOON.

The port of Rangoon during the year reached its highest level of prosperity up to date. The revenue was 51.84 lakhs (\$1,681,852), or 7.91 lakhs (\$256,627) more than the previous year and 23 per cent above the budget estimate, while the expenditure was 39.03 lakhs (\$1,275,023), or 5 per cent, less than the budget estimate, giving a net surplus on the year's work of 12.81 lakhs (\$415,275).

The net registered tonnage of shipping entering the port amounted to 2,946,774 tons or 84,106 tons more than the previous year, which was itself a record. The total tonnage of exports during the year was 3,303,347 or 636,347 more than last year. Comparing the figures with those of 14 years ago, the revenue has increased by 450 per cent, the tonnage of shipping by 100 per cent, and the value of the trade by 150 per cent.

The river training works, a nonrevenue producing scheme which has been a source of considerable anxiety, was completed during the year at a cost of 138 lakhs (\$4,477,180).

CONCLUSION.

Last year I asked whether Indian ports fulfilled the requirements of modern ports in giving facilities for prompt dispatch of steamers and ample storage accommodation for goods and I suggested that Bombay, Karachi, and Rangoon had met these requirements, but that at Calcutta trade had overtaken the accommodation.

This year under the shadow of a terrible war the principal concern of Indian ports is to pay their way and it will probably be some time before there occurs another year of such universal prosperity as the one under review.

Calcutta has already felt the pinch and anticipates a very large budget deficit. The other ports must each suffer in varying degrees, as even where there are large exports in view, shortage of tonnage and highness of freight adversely affect the trade. It is therefore satisfactory to note that with the exception of Calcutta, which at all costs must proceed with its new works project, the preliminary estimate for which amounts to 446 lakhs (\$14,469,700), the ports can afford to postpone for the time being the incurring of further heavy capital expenditure.

RAILWAY SYSTEMS.

The railway systems of India may, broadly speaking, be divided into two classes: (1) Railways owned by the State, whether they are worked by the State or by the agency of companies, which comprise all the larger systems, with the exception of the Southern Punjab, the Bengal & Northwestern, and the Jodhpur-Bikaner Railways; (2) railways owned by Native States and independent companies, whether worked by the owners or by the main lines with which they connect.

Railways owned by the State are supplied with funds from the State Treasury. Capital is raised in London by the issue of India stock and of additional share capital and debentures issued by railway companies on the requisition of the Secretary of State. Both securities are guaranteed by the Secretary of State against the general revenues of India. Capital is raised in India by the issue of Government paper, which is also guaranteed against the general revenues of India.

The Government of India prepares annually a program of capital expenditure during the coming year, the amount of which is determined mainly by the extent to which it is deemed prudent to issue stock or railway companies' debentures in that year, together with the amount available from the surplus revenues of the State and Government savings banks' deposits, on which interest is paid by the State to depositors at $3\frac{1}{2}$ per cent. Each railway administration prepares its own program, which it submits to the Railway Board, and these individual programs, after careful scrutiny and discussion with the agent or manager concerned, are revised with reference to the amount fixed for the general program, into which they are then incorporated. Finally the general program of the Railway Board is submitted for the sanction of the Secretary of State for India and provision is made for the requirements of each railway in the budget of the Government of India.

The State entirely finances its railways as regards their capital requirements and their working expenses. The profits to the State from the working of its railway systems in general show substantial increases from year to year. For instance, the surplus that accrued to the Imperial Exchequer as a result of its railway property, after paying all interest and working charges and providing a large sum out of revenue for paying off annuities, amounted for the year ended March 31, 1914, to approximately \$24,000,000.

MILEAGE—INDIA RAILWAY BOARD.

The companies working State railways arrange for the supply of all material and also for the execution of works. The total mileage of the State-owned railways is about 25,000.

The mileage of the Indian railways not classed as State amounts to about 8,000, their capital outlay to about \$165,000,000, and their net revenue to about \$10,500,000 per year. The mileage of this class of railways is steadily increasing, especially as the rulers of the

Native States seem to be growing more appreciative of the advantages of railway communication in their respective territories and find it good policy to invest surplus revenues in the construction of railways, especially as such expenditures reduce the cost of maintaining numerous road communications. The non-State or privately owned railways receive in most cases assistance in some way from the State, or from the main lines in the case of feeders, or from local bodies.

The construction of State railways in India was originally under the control of the Public Works Department of the Government of India, but in 1905 it was intrusted to a special railway board, consisting of a chairman and two members, with a secretariat establishment, all under the general direction of the Commerce and Industry Department of the Government of India. In 1908 the railway board with its staff became known collectively as the Railway Department and was made independent of the Department of Commerce and Industry, the chairman of the board then becoming president of the board and being allowed direct access to the Viceroy.

The offices of the Government of India Railway Department, or Railway Board, are in Simla between April and November and in Calcutta between November and March, but will be in Delhi after the completion of the new Capitol. The address of the representative of the board in England is India Office, Whitehall, London. The work of the Railway Board is divided among eight branches, as follows: (1) Railway establishment, (2) railway construction, (3) railway traffic, (4) railway projects and general, (5) railway stores, (6) railway statistics, (7) drawing branch, (8) audit and accounts. Each of these is under the charge of an assistant secretary, except the audit and accounts department, which is under the accountant general of railways.

While the Indian railways usually have their headquarters and offices at their chief traffic centers in India, they are mainly controlled by boards of directors in London, although to a great extent their operation is supervised by the Railway Board of India. The persons who locally manage the railways are known as agents, except in the case of railways operated directly by the State, when they are known as managers. The Railway Board of India is responsible for public safety in respect to proper maintenance of lines, in applying precautions to prevent accidents, and in fixing dimensions of works and rolling stock to insure safety. The railway stores branch of the Railway Board of India makes estimates and designs for rolling stock (including motor cars), plant and machinery, signaling and interlocking, railway ferries, steamers, etc.; makes allotments of funds in connection with indents for stores; and itself indents for stores for State railways and some Native State railways, and for rolling stock in connection with military mobilization. It tenders and contracts for coal, sleepers or ties, and cars for State railways; ratifies contracts for supply of materials; keeps a record of surplus stores; and compiles and distributes every quarter the lists of stores purchased by the India Office for the State railways. It also makes inspections and tests of materials purchased of local dealers.

PURCHASES USUALLY MADE IN ENGLAND.

It is the general policy of the Indian railways, whether operated by companies or directed by the State, to make most of their pur-

chases in England, unless supplies or equipment are urgently required, when they may be purchased locally, if in stock. Occasionally supplies or equipment may be obtained from other countries when not conveniently obtainable in either England or India. For instance, the Railway Board of India imported for experimental purposes creosoted Oregon-pine sleepers or ties and uncreosoted California redwood, and that several Indian railway companies purchased locomotives in Germany, owing to the inability of English manufacturers, with their large number of unfilled orders on hand, to insure speedy delivery.

Although the purchasing of all material and stores in large quantities is under the control of the head offices in London, it is evident that as such material is purchased in accordance with the indentures submitted from India, the local offices must naturally have considerable to do with the selection of types of material, equipment, etc., with which to meet their requirements; so that it would seem advantageous for American manufacturers to keep the local agent, chief engineers, and mechanical engineers, as well as the Railway Board of India, supplied with their catalogues and other information as to articles of equipment or material which they think might be of special advantage in India, and perhaps superior, cheaper, or possibly more promptly supplied than could be done by English firms.

FERRY BETWEEN CEYLON AND INDIA.

A new route was opened up in October, 1913, for traffic between the island of Ceylon and the mainland of India by making rail connections on both the Ceylon and Indian sides to Adam's Bridge, which is a reef 22 miles long, partly submerged and partly exposed, and lying within the narrowest part of the Palk Strait separating Ceylon from India. A ferry service is operated between Manar on the Ceylon side and Rameswaram on the Indian side. In time it is anticipated that there will be railway connection all the way between Ceylon and India over Adam's Bridge by construction somewhat similar to the Florida East Coast extension to Key West, or by ferrying trains across.

The new ferry service route supplants, for coolie traffic at least, the all-steamship route from Colombo, in Ceylon, to Tuticorin, the southern terminus of the South Indian Railway. Because of the shallow water on the Indian side, these steamers formerly lay 6 miles from Tuticorin, and passengers and freight were transferred to the steamer in launches. But with the new route, the Adam's Bridge reef acts as a breakwater, so that vessels travel on one side or the other, according to the monsoon prevailing, in smooth water.

PASSENGER TRAFFIC—FREIGHTS.

Corridor trains are very rare in India. The first and second class carriages have four-berthed compartments, which are roomy and comfortable, although not at all ornate in appearance. Considerable attention is paid to making the roof construction sunproof. Special windows of dark glass and blinds are used to mitigate the sun's glare. Electric lights and fans are generally used. By far the greater part of the passenger traffic is third class and is practically restricted to natives of the working classes.

The average tonnage of goods moved amounts to over 78,000,000 per year. There is a tendency to build light narrow-gauge railways

to supplement existing systems, and there is even much discussion as to the possibility of using motor cars or trucks as feeders for railways. Some experiments are also being made to determine the possibility of using oil as fuel for railway engines.

The Railway Board of India has issued instructions to install electric lighting in all carriages on State-worked railway systems. The change will of necessity take time to carry out, but the general adoption of electric lighting has now been decided on and will gradually be brought about as funds and time permit.

NEW MILITARY RAILWAY CAR.

The *Bombay Times* gives a description of a military railway carriage that has been constructed at the new shops of the Great Indian Peninsula Railway at Matunga, in the *Bombay Presidency*. The original features of this new type of car are mentioned as follows:

The body of the car is 68 feet long and 10 feet wide outside, built of Burma teak, on a substantial steel underframe. The construction adopted is novel inasmuch as in order to secure the largest possible cross section the body and underframe are incorporated as one structure. The adoption of the construction mentioned secures an extra 4 inches in the internal height of the coach without encroaching on the limited "loading gauge" of the Indian railway, while retaining wheels of standard diameter (3 feet 7 inches). The dimensions of this car practically represent the maxima permissible before the widening out of the trucks now in progress is complete.

The internal fittings consist of folding berths to accommodate 66 soldiers. These are arranged in three tiers on galvanized steel tubular framing, very similar to those of a troop ship. The rows of berths open off a side corridor 2 feet wide. Under the lower seats or berths are rifle racks, while above the uppermost are large parcel racks for the soldiers' kit, and lavatory accommodation is provided at each end, the arrangements being convertible for the use of Indian travelers when the car is in ordinary traffic.

The cars will be closely coupled and vestibuled together with wide gangways, so that through communication is established between the cars. This is required for the service of meals, etc., which can be done from a central kitchen or cooking car.

The arrangements for water supply have been specially considered, no less than 500 gallons being carried under each car in specially designed tanks which can be readily cleaned. A supply of filtered drinking water is also provided.

Very thorough ventilation is secured by having a series of openings fitted with "venetians" and shutters above the ordinary windows, thus providing a double row of "Monarch" air exhausters along the roof. This combination insures a constant current of air from the sides of the coach to the center.

ENGINEERING DIFFICULTIES—BRIDGES—TUNNELS.

Although the greater part of India that is traversed by railways is more or less flat and construction easy, there are many hilly sections where the grades are very steep, and there are several mountain railways, like the lines to Simla and Darjeeling, where great engineering difficulties have had to be overcome. One of the most distinctive features of Indian railways is the provision for crossing large and numerous rivers, necessitating often, in addition to the bridges, expensive training works to insure that the river keeps the site chosen for the bridge. Over 100 bridges on Indian railways have cost more than \$200,000 each, while quite a number have cost well over \$1,000,000 each. The greatest undertaking in India in the way of bridges, and in fact one of the greatest in the world, is that now under the course of construction across the Ganges River near the town of Sara. (See page 79.) The longest tunnel in India is that on the Baluchistan extension of the Northwestern Railway near New Chaman, about 10

miles from the Afghan frontier. This 2½-mile tunnel is guarded by blockhouses, as are various bridges and other tunnels near the frontier, a strong military force being always in the vicinity.

WORKING SWITCHES AND SIGNALS.

Railway signaling in India generally conforms to English practice, except that the use of power for working switches and signals is rare, owing to the expense of providing the necessary skilled labor to maintain it. The educated Indian who is capable of employment as a signalman will not, as a rule, do such manual labor as pulling over switch and signal levers. It is the general custom, therefore, to employ uneducated men in the signal boxes, the station master being responsible for the block working, keeping the block instruments in his office. Usually the station master, in order to have a positive control over the signals, uses keys of the Annett type, which he sends to the outlying cabin by hand, when required. A development of this arrangement is the "electric key transmitter," invented by Maj. Hepper, of the Great Indian Peninsula Railway, which is being largely introduced in India.

WORKSHOPS—LOCOMOTIVES—RAILWAY ACCIDENTS.

With the exception of the Bombay, Baroda & Central India Railway, which has extensive workshops at Ajmer, in Rajputana, the Indian railway companies build few complete engines and coaches. The East Indian Railway Co., however, has shops where it makes iron sleepers, permanent way fittings, points and crossings, and signaling and interlocking apparatus. It also puts woodwork on carriages and makes certain parts of carriages and wagons. The Bengal-Nagpur Railway has extensive workshops, which are engaged chiefly in carriage and wagon work, repairs to locomotives, and in the manufacture of smaller articles. The largest railway shops in India will be those which are now under course of erection by the Northwestern (State) Railway at Lahore, where it is probable that the work for all the State lines will be concentrated. The locomotives in use in India are mainly imported from the United Kingdom and are not of very powerful types. As Indian traffic conditions are more like those of the United States than of England, there would seem to be a good field in India for American locomotives; for, although it is the policy of Indian railways to buy their equipment in England, there are cases where necessity or special convenience causes them to buy elsewhere.

Considering the thickly populated country through which many Indian railways pass, accidents are not common. In 1913-14 the total killed, including passengers, railway employees, and others, was 2,338. Of this number 208 were suicides.

Indian railways had at the close of the 1913-14 period 633,694 employees. Of this number 7,988 were Europeans, 10,437 Anglo-Indians, and 615,269 Indians. At the close of 1913-14 there were 10,992 children and 8,943 apprentices and workmen in railway schools.

PRINCIPAL RAILWAY LINES.

Assam-Bengal Railway.—Headquarters, Chittagong, Bengal; London office, Bishopgate House, E. C.; 805 miles 3.28-foot gauge;

starts from Chittagong, near the Bay of Bengal, and runs through the Surma Valley across the North Cachar Hills into Assam. It is worked under a limited guaranty by a company whose contract is terminable in 1921; its operations ordinarily involve a loss to the State.

Assam Railways.—Headquarters, Margherita, Assam; London office, 85 London Wall, E. C.; 122 miles 5.28-foot gauge; practically a feeder to the Assam-Bengal Railway.

Bengal & Northwestern Railway.—Headquarters, Gorakhpur, United Provinces; London office, 237 Gresham House, E. C.; 1,981 miles 5.28-foot gauge; an important system in the northeastern part of India, making a web of much of the country north of the Ganges River. It has connections with other railway systems at Cawnpore and Benares. It makes a net income on capital of about 8 per cent, which is divided between the Government and the company.

Bengal-Nagpur Railway.—Headquarters, Garden Reach, Calcutta, Bengal; London office, 132 Gresham House, E. C.; 2,546 miles 5.5-foot and 2.5-foot gauge, about one-third of the system being the latter; the most important railway in the Central Provinces. It covers about one-half of the distance between Bombay and Calcutta, on the Calcutta end, and does a large business in the through traffic between the two cities. It earns about 6 per cent net on its capital.

Bombay, Baroda & Central India Railway.—Headquarters, Bombay; London office, 110 Bishopsgate, E. C.; local purchasing agent, the Chief Storekeeper, Parel, Bombay; 948 miles of 5.5-foot gauge and 1,827 miles of 3.28-foot gauge; 7,272 vehicles, of which 287 are locomotives; one of the original guaranteed railways. It extends north from Bombay to Baroda, Ahmedabad, and Delhi, and makes connections with the leading railway systems of northern India. It earns nearly 10 per cent net on its capital.

Burma Railways.—Headquarters, Rangoon, Burma; London office, 199 Gresham House, E. C.; 1,527 miles 3.28-foot gauge; connects the two chief cities of Burma—Rangoon and Mandalay. It is operated by a company under a guaranty; its net earnings are nearly 5 per cent.

Eastern Bengal State Railway.—Headquarters, Calcutta, Bengal; London office, India Office, Whitehall; 501 miles 5.5-foot gauge; operates from Calcutta north across the Ganges River to the Himalaya Mountains and almost into Tibet. In connection with the Darjeeling-Himalayan Railway a narrow-gauge line of 51 miles, it affords the route between Calcutta and Darjeeling. It is operated by the State and earns nearly 5 per cent on its capital.

East Indian Railway.—Headquarters, Calcutta, Bengal; London office, 28 Nicholas Lane, E. C.; 2,710 miles 5.5-foot gauge; one of the most important systems in India. It gives the only direct access to the port of Calcutta from northern India, and is fed by all the large railway systems connected with it. It is leased by a company under contract and earns about 10 per cent on its capital.

Great Indian Peninsula Railway.—Headquarters, Bombay; London office, 48 Copthall Avenue, E. C.; 2,901 miles 5.5-foot gauge; 14,808 vehicles, 1,010 of which are locomotives; the first railroad in India. Local purchasing agent, the General Storekeeper, Parel, Bombay. It extends from Bombay north to Agra and Cawnpore and east to Jubbulpore, where it connects with the East Indian Railway system for Calcutta; it also connects at Nagpur with the Bengal-Nagpur Railway for Calcutta. It is thus a through route to Calcutta,

covering the western half of the distance. It is an important route to Madras, connecting with the Madras & Southern Mahratta Railway at Raichur, and to Hyderabad, connecting with the Nizam's Guaranteed State Railway at Wadi. It is operated by a company under contract with the State and makes nearly 7 per cent on its capital.

Northwestern Railway.—Headquarters, Lahore, Punjab; 4,846 miles 5.5-foot gauge; the most extensive system in India. It operates in northwestern India and Baluchistan, and connects the port of Karachi, on the Arabian Sea, with the great wheat districts of the Punjab in the northwest Frontier Province. In the Punjab it forms quite a network of lines. Generally speaking it follows the Indus River and tributaries north and south. It reaches close to the frontier of Afghanistan at Peshawar, in the northwest Frontier Province, and at New Chaman in Baluchistan. It is a State railway, its frontier extensions being operated more for military than for commercial purposes, and, although the system in Baluchistan is operated at a loss, in its entirety it earns a little over 5.5 per cent.

Madras & Southern Mahratta Railway.—Headquarters, Madras; London office, 91 York Street, S. W.; 2,091 miles of 3.28-foot gauge and 1,041 miles of 5.5-foot gauge; an important line from Madras to the Native States of Mysore and Hyderabad; and northward, via other lines, to Bombay and Calcutta. It is a loss to the State.

Oudh & Rohilkhand Railway.—Headquarters, Lucknow, United Provinces; 1,435 miles 5.5-foot gauge; a system operating chiefly north of the Ganges River, connecting such important cities as Benares, Allahabad, Lucknow, and Cawnpore; and providing connections with other important systems of northern India. A bridge over the Ganges connects this line with the East Indian Railway to Calcutta. It is worked as a State railway and earns nearly 7 per cent.

South Indian Railway.—Headquarters, Trichinopoly, Madras; London office, 91 York Street S. W.; 446 miles of 5.5-foot gauge and 1,249 miles of 3.28-foot gauge; a system serving the whole of the extreme southern portion of India, southwest of the Madras and Southern-Mahratta lines. It connects, by a ferry service across Palk Strait, with the Ceylon Government Railway. (A new direct route to Ceylon, via Rameswaram, has been opened.) It is operated by a company under a State guaranty, and earns nearly 8 per cent.

NATIVE STATE RAILWAYS—IMPORTANT RUNS.

Nizam's Guaranteed State Railway.—Headquarters, Secunderabad, Hyderabad State; London office, Winchester House, E. C.; 355 miles of 5.5-foot gauge and 442 miles of 3.28-foot gauge; the most important of the Native State railways. This system in Hyderabad was constructed by a company under a guaranty from that State.

Among other Native State railways may be mentioned the Kathiawar lines constructed by the several chiefs in Kathiawar; the Jodhpur-Bikaner Railway, constructed by the Jodhpur and Bikaner chiefs; the system of the railways in the Punjab, constructed by the Patiala, Jind, Maler Kotla, and Kashmir chiefs; and the railways in Mysore, constructed by the State of Mysore.

The most important runs are: Bombay to Calcutta, 1,233 miles, taking about 43 hours; Bombay to Madras, 794 miles, 31 hours; Bombay to Peshawar, 1,450 miles, 50 hours; and Calcutta to Pesha-

war, via Delhi, 1,501 miles, 57 hours. Some of the chief European passenger traffic is from the leading cities to the "hill stations," which requires change to small narrow-gauge lines.

[By Consul General James A. Smith, Calcutta.]

OPENING OF THE LOWER GANGES BRIDGE.

A most important event in India was the recent opening of the Lower Ganges Bridge on the Eastern Bengal Railway. This bridge, which has been usually called the Lower Ganges or Sara Ghat Bridge, will now be known as the Hardinge Bridge, in honor of the present Viceroy of India, who formally opened it on March 4, 1915.

The Ganges in this part of India has been one of the chief obstacles to railway facilities in northern Bengal and Assam. The new bridge removes a part of these obstacles by giving direct access to these districts, which, as stated by the Viceroy, have the largest areas in the world under jute and tea. His excellency further pointed out that the bridge was a link in the chain of eventual direct railway communication with Burma, a project which is now being worked out and which it is hoped will materialize before many years.

The construction of the bridge was first seriously proposed in 1889, but, owing to various controversies as to the best site, it was not until 1908 that the work was commenced. The project involved, first, the stabilization of the course of the river, and, secondly, the construction of the bridge itself. The Ganges, with its shifting sands and consequent constant variation in channel, especially at the period of floods during the monsoon, was first to be conquered, and the work involved in the stabilization of the channel was enormous and offered many difficulties. Any work in the river which is not finished and completely safeguarded by the time of the arrival of the flood runs the risk of swift destruction, and it is this which has caused the chief anxiety in the completing of the bridge.

The bridge consists of 15 spans of girders of 345 feet $1\frac{1}{2}$ inches each, with 3 land spans of 75 feet each at each end. It is founded on wells or piers sunk to 150 feet to 160 feet below low-water level. It provides a double line of railway and a footway. Some 26,000,000 cubic feet of pitching stone have been used altogether in the bridge and training works. Each well weighs 15,000 tons, and all the wells and piers weigh 300,000 tons. Each span of girders weighs 1,200 tons, and there are 30,000 tons of steelwork in the whole bridge; 1,700,000 rivets have been put in. Owing to the good fortune which has attended the work, it has been possible to construct the bridge for a lower sum than was at one time anticipated. The cost, exclusive of further credit for plant, has been 39,900,000 rupees (\$12,945,000); 10,800,000 rupees (\$3,504,000) was expended for the training works to stabilize the channel, 7,600,000 rupees (\$2,466,000) for the approach, and 21,500,000 rupees (\$6,975,000) for the bridge proper. It is anticipated that this outlay will be thoroughly justified by the increased traffic which will follow on the construction of the bridge and the saving that will be effected by the abolition of the river ferry service, the recurring cost of which has been equal to a considerable part of the interest charges on the capital now expended.

TRAMWAYS.

THE STREET-CAR SYSTEM OF BOMBAY.

[By Consul Edward J. Norton, Bombay.]

Bombay, the capital of the Bombay Presidency and the principal seaport of western India, is an island which forms a low-lying plain about $11\frac{1}{2}$ miles long by 3 to 4 broad. Two parallel ridges of low hills flank the island; the larger ridge protects the harbor, the other terminates in Malabar Hill on which stands the famous Hindu temple of Walkeshwar, to which pilgrims resort from all parts of India. The city covers 23 square miles and has a population of 979,445.

EQUIPMENT AND OPERATIONS.

The street-car system now comprises about 20 miles of double-track and about 2 miles of single-track lines. Wide, level streets and avenues and long blocks permit of a comparatively high rate of speed within the main or European business center, but as the cars take on most of their passengers at various points in the populous and congested bazaar districts, traffic is not rapid. The passenger equipment comprises in all 100 cars run on double bogie trucks, 50 single trucks, and 30 trains. The latter are two single trucks linked together and have one motor in each.

The type of cars used on the Bombay system are arranged for double-end operation and consist of (1) open-side bogies with entrances and exits at both ends with a carrying capacity of 50 passengers; (2) open-side single-truck cars with entrances and exits at both ends carrying 32 passengers; and trains, the lower part of these closed and the upper left open. Service cars, such as sweepers and sand cars, are not in use.

The number of cars in normal operation average 168 daily. The car and train mileage run during 1912 was 3,910,676 with 38,612,582 passengers carried. The number of passengers per mile of track was 1,755,117. This high figure indicates the congestion of population.

EXTENSIONS INTO SUBURBS—BUILDING OF RESIDENCES.

Out of the 31 municipal districts in Bombay there are 3 containing more than 700 persons per acre, 3 districts with more than 500 per acre, 4 districts with more than 400, and 6 with more than 200 persons per acre. The street-railway system, which is now carrying nearly 15,000,000 passengers more per year than it handled six years ago, has arranged its route so as to traverse and serve these thickly populated districts. There is needed, however, better transportation facilities in sections outside the municipal boundaries and to a number of populous suburbs.

The rapid increase in rents and overcrowding in the city have resulted in late years in driving the middle classes out to the suburbs,

where many residences and tenements are being erected. This tendency to move out toward the opener and clearer part of the north of the island will be rapidly developed when street-car facilities make the suburbs more accessible.

TRAMWAY EXTENSIONS.

Though additions and extensions are continually being made to the tramway service of the Bombay Electric Supply & Tramways Co. (Ltd.), which controls the tramways of the city, yet Bombay is still inadequately served, so that this corporation is now making extensive plans to cope with growing traffic. A wide road is being cut through a hill to lead into the docks area for an extension of the tramway system. Motor buses of the type now used in London may also be imported for use on streets too narrow for ordinary tramways.

At the suggestion of the governor of Bombay, two electrical engineers of well-known reputation, Mr. C. H. Merz and Mr. F. F. P. Sisacre, of the English firm of Merz & McLellan, visited Bombay to consider electrifying the Bombay suburban railways systems and the adjacent railway system of the Port Trust. These engineers submitted a report to the boards of the Bombay, Baroda & Central India Railway Co., the Great Indian Peninsula Railway Co., and the Bombay Port Trust, who are the authorities immediately concerned. Their report heartily recommended as a practical proposition a proposal to furnish Bombay with a first-class system of electrical railways communicating with its suburbs. The capital cost was estimated at nearly \$4,000,000. The report stated that there would be a gain by electrification of about \$350,000 annually, an increase of about 20 per cent in speed, also improved punctuality, greater frequency of trains, and the development of residential area. For the Bombay suburban lines there was proposed a "train unit" of three coaches; that is, three coaches coupled permanently together and having a motor in one coach, so that they can be run as a small train by themselves or joined to another similar unit to make a longer train. A train of three, six, or nine coaches can thus be made up from such "train units," while a train of any intermediate number of coaches can be run, provided there is a sufficient proportion of motor coaches.

GASOLINE TRAMWAYS.

The Times of India, of Bombay, contains the following editorial note on the advantages of "petrol" or gasoline tramways in India for cheap urban transit:

One of the mechanical problems which has to be solved in India is the provision of quick mechanical transport in the smaller towns. In the great cities like Calcutta, Bombay, and Madras electricity has established itself, and despite low fares and long distances has proved profitable. But there are many lesser towns where the traffic will not stand the heavy first cost of electric traction. In these circumstances the experience of Karachi is most valuable. The London Times calls attention to it in an article on the report of the East India tramways. The Karachi trams were laid in 1882 and first operated by steam. This proved a failure and had to be replaced by horse traction. This was little better; the company had to be reconstructed, and it struggled along until the simplex petrol tram was introduced in 1909. In the past four years the profits have increased by 380 per cent and the company is now flourishing. We are not, however, concerned with the financial position of the company—that has no doubt been largely influenced by the growth of Karachi—but with the operating expenses. The average cost of work is 9.8 cents per car mile, after making

allowance of 1.6 cents per car mile for depreciation, which is a liberal figure. The lowness of these costs is best understood by comparison. The average cost per car mile on the electric tramways of Great Britain is 13.08 cents and that of motor omnibuses varies between 14.2 cents and 22.8 cents per car mile. The comparison is not, of course, exact, but it is sufficient to indicate the remarkable cheapness of the petrol car in certain conditions and seems to open up a wide field for its adoption in the lesser towns of India.

Not only at Karachi, but at Baroda, the capital of the Native State of the same name, gasoline tramways have proved successful and made it possible to afford rapid transit for native passengers who can pay only very low fares.

EQUIPMENT OF INDIA AND CEYLON TRAMWAYS.

The following data concerning the construction and equipment of the tramways of the cities of India and Ceylon was compiled by the Electrician, of London, in February, 1914:

Bombay, India.—Bombay Electric Supply & Tramways Co.; engineer in chief, C. W. G. Little (London, England). Line opened, May, 1907. Contractor for equipment of line, J. G. White & Co., and for power station, Brush Electrical Engineering Co. Gauge, 4 feet 8½ inches; 1.46 miles single and 18.92 miles double track; British standard sections No. 1 and No. 1C rails. Conductor suspended by span, bracket, and center pole, Tri insul. mech. ears; feeders, Callender's, 0.4 square inch size. Line voltage, 550. Return conductor and bonding—rails with pin bonds and neg. boosters. Type of passenger cars—max. trn. bogies and s. tr., S. D., open sides; 210 motor cars, 2 motors, ord. hand and Peacock brakes. Power-house equipment—14 water-tube boilers; generating sets—Brush (turbos and recip.); generated at 5,500 altern.; 3 ph. 50 altern. syn. motor gen. convs.); total capacity in k. w., 7,000 (including lighting, power, and plant).

Calcutta, India.—Calcutta Tramways Co.; W. P. Allen, engineer in chief; T. E. Pallant and W. P. Allen, joint managers. Line opened, 1902. Contractors for equipment of line and power station, Dick, Kerr & Co. Gauge, 4 feet 8½ inches; 34½ miles double track; 95-pound girder rails. Conductor suspended on span wire and side and center poles; feeders, Callender's. Line voltage, 500. Return conductor and bonding—rails with bonds. Type of passenger car—S. D. motor cars, M. & G. Rad. trucks; 270 motor cars and trailers, 2 motors, 1 hand and 1 electric brake (Peacock). Power-house equipment—6 Lancashire, 6 B. & W. boilers; generating sets, Dick-Kerr, Yates & Thom., and Belliss; total capacity in k. w., 2,500.

Colombo, Ceylon.—Colombo Electric Tramways & Lighting Co.; L. H. Combe, engineer in chief and manager; Boustead Bros., agents. Line opened 1898. F. Smith & Co., contractors for equipment of line, Colombo Electric Tramway & Lighting Co., contractors for equipment of power station. Gauge, 3 feet 6 inches; 9 miles double track; 95-pound girder rails. Conductor suspended by span wires, side and center poles; feeders, F. Smith, 00 and 0. Line voltage, 550. Return conductor and bonding—thermit welding (14 in.) with $\frac{1}{16}$ inch bonds. Type of passenger car—S. and bogie trucks, M. & G. Warner, S. D., 44 motor cars, 2 motors, hand and rheostatic brakes. Power-house equipment—4 B. & W. boilers, 140,000 pounds; generating sets—Dick-Kerr Lancs. D. & M. and G. E. C. dynamos, Belliss & Diesel engines (800 steam); total capacity in k. w., 2,000.

Delhi, India.—Delhi Electric Tramways & Lighting Co.; Kincaid, Waller & Co., consulting engineers; J. G. Griffin, engineer in chief and manager. Line opened June, 1908. Contractors for equipment of line and power station, Bruce Peebles & Co. Gauge, 3 feet 3½ inches; 9.46 miles single track, 90-pound Bessemer rails. Conductor suspended by flexible suspension to bracket arms supplied by channel steel poles, part span; feeders, 4/0 S. W. G. Line voltage, 500. Return conductor and bonding—rails. Type of passenger car—S. D. open type, 4-wheeled truck; 24 motor cars, 1 motor, hand and rheostatic brake. Power-house equipment—3 B. & W. boilers; generating sets—see lighting plants.

Mandalay, Burma.—Burma Electric Tramways & Light Co., A. H. Burbridge, tram manager; B. C. Chase, assistant engineer. Line opened 1904. Contractors for electrical equipment of line and power station, Dick, Kerr & Co. Gauge, 3 feet 6 inches; 7 miles double track; 85-pound girder rails. Span wire suspension of conductor; overhead feeders, $\frac{1}{8} \times \frac{1}{8}$ in. size. Line voltage, 500. Return conductor and

bonding—rails with pin bonds. Type of passenger car—S. D. open; 24 motor cars, 2 motors on each; electric and hand brake. Power-house equipment—3 B. & W. boilers; Dick-Kerr—Belliss, Willans, and Diesel generating sets, total capacity in k. w., 550.

Madras, India.—Madras Electric Tramway (Ltd.); J. F. Jones, chairman, engineer and joint manager. Line opened May, 1895. Contractors for electrical equipment of line and power station, Electric Construction Co. Gauge, 3 feet 3½ inches; 13½ miles single and 4 miles double track; 60, 90, and 96 pound girder rails. Conductor suspended on span wires, center poles, and side poles; feeders, Callender's sheathed, armed, and Gloves, 0.7 to 0.1 square inch size. Line voltage, 500. Return conductor and bonding—rails w. copper Columbia special bonds and boosting. Type of passenger car—open S. D. and closed corridor; 68 motor cars, 8 trailers, single and double and bogie motors, 2 hand brakes. Current taken from Madras Electric Supply Corporation.

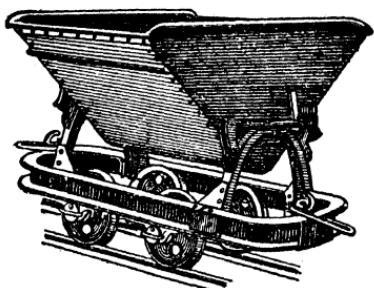


FIG. 5.—Tramway tip truck.

and bonding—single protecting bonds. Type of passenger car—33 S. D., S. Tr., 19 bogies; 52 cars, 2 motors on each; 1 electric and 1 hand brake. Power-house equipment—6 B. & W. boilers, two 700 k. w. and one 1,500 k. w. Curtis turbine sets, and one 500 k. w. Belliss-B. T. H. set, one 500 k. w. and one 300 k. w. motor generators; total capacity in k. w., 3,400.

TRAMWAY TIP TRUCKS.

Tramway tip trucks have been imported into India from Germany in large numbers, chiefly for use by local governments and private contractors in connection with canal cutting for irrigation projects, railway building, port improvements, and other works requiring easy transport of earth, cement, bricks, and other material.

The trucks imported have about 1 cubic yard capacity and weigh 12 to 14 pounds per foot, the most desirable, it is said, weighing 16 to 20 pounds per foot. They fit on rails of 2 feet gauge and sell at about \$31 to \$33 each. Track outfits are sold by the mile in connection with these trucks. They have become the most popular labor-saving device known in India in connection with great construction works. They tip their load sideways.

ELECTRICAL PLANTS AND SUPPLIES.

USE OF ELECTRICITY.

Although practically no electrical machinery is made in India, the advantages of electricity for various purposes are becoming widely known, and extensive developments have already taken place in this country, and are now proceeding, in electrical distribution for both lighting and power. It will be convenient to summarize here the more important public schemes now in operation in India, or to be started in the near future.

The chief plants operated by water power are: Tata Power Co., Bombay, 32,000 kilowatts (to be increased subsequently to 100,000 kilowatts); Cauvery Falls, Mysore, 12,400 kilowatts; Jhelum River, Kashmir, 4,000 kilowatts; Darjeeling, 2,500 kilowatts; Mussoorie, 1,900 kilowatts; Simla, 750 kilowatts; Jammu, Kashmir, 700 kilowatts. The total power of these seven installations is thus about 54,000 kilowatts, or 71,000 horsepower.

The principal stations worked by steam power and oil engines are: Calcutta, 14,800 kilowatts; Calcutta tramways, 2,900 kilowatts; Bombay, including tramways, 9,000 kilowatts; Rangoon, including tramways, 5,400 kilowatts; Madras, including tramways, 3,800 kilowatts; Colombo, including tramways, 1,550 kilowatts; Kolar Mines Co., 1,500 kilowatts; Dacca, 900 kilowatts; Delhi, including tramways, 840 kilowatts; Cawnpore, including tramways, 850 kilowatts; Gwalior, 700 kilowatts; Lahore, 600 kilowatts; Kandy, 540 kilowatts; Mandalay, 520 kilowatts; Bikaner, 500 kilowatts.

The total power of these stations amounts to about 58,000 kilowatts (77,000 horsepower), of which about 1,800 kilowatts is generated by Diesel oil engines, 8 in number, distributed among six stations.

TRANSMISSION OF POWER.

Some of the longer distances of transmission are detailed below, together with particulars of the pressures of generation and transmission, and the frequencies used:

Plants.	Distance in miles.	Voltage of genera- tion.	Voltage of trans- mission.	Peri- odic- ity.
Cauvery Falls.....	{ 92 58 40	2,200	{ 35,000 32,500 21,000	25
Jhelum River.....	55	2,300	{ 60,000 30,000	50
Tata Power Co.....	43	6,600	100,000	50
Simla.....	21	2,200	15,000	.....

It will be seen that electric power is already being transmitted in India to distances of 50 to 100 miles, with the use of appropriate

"extra high" pressures, the generators being driven by water power. With the ordinary conditions of the present day, it is found that the limiting distance is generally from 100 to 200 miles in large powers, such as many thousands of horsepower, while in small schemes this distance is greatly reduced.

ELECTRICITY FOR KARACHI.

The proposition to supply electric energy in Karachi has taken definite shape. It is stated that the Government has donated the necessary land for the plant, and applications for stock in the Karachi Electric Supply Corporation are being received. The new corporation is to have a capital of 1,000,000 rupees (\$324,433), and stock to the amount of 600,000 rupees (\$194,600) is offered for subscription. The corporation is to be under the charge of Forbes, Forbes, Campbell & Co., of Karachi, as agents, with Handcock & Dykes, 11 Victoria Street, London, as consulting engineers. Owing to the high cost of coal and water, Diesel oil engines are to be employed. The plant is estimated to cost 500,000 rupees (\$162,216), and the directors hope for a dividend of 7 per cent during the first year of operation. The plans and estimates were prepared by Compton & Co., Salisbury House, London Wall, and it is probable that the greater portion of the machinery and supplies will be of British manufacture.

ELECTRICITY FOR AHMEDABAD.

At the first general meeting of the Ahmedabad Electricity Co. (Ltd.), at its offices in Killick Buildings, Bombay, the president of the company, Sir Henry E. E. Proctor, stated:

The construction of the generating station is just about to be started, and the building will be ready to receive the machinery when it arrives. You will remember that it was stated in the prospectus that the system of distribution proposed for Ahmedabad was the low-tension direct-current system. After careful consideration and acting on expert advice, the board has decided to change the proposed system to alternating current. The supply will now be generated at 3,300 volts three-phase alternating and transformed down to 400 volts three-phase four-wire for general purposes. This alternating system lends itself to more ready expansion than is the case with direct-current supply. The board has also decided to increase slightly the initial capacity of the generating station by increasing the size of the third unit.

ELECTRICITY IN CALCUTTA.

The electrical engineers in Calcutta have formed a local section of the Institution of Electrical Engineers, of which Mr. R. Winkfield, a leading engineer of that city, has been elected the first chairman. At the inaugural banquet Mr. Winkfield said:

There is a very large future for our work here. In that future the lights and fans we have so far dealt with almost entirely will become [comparatively] a negligible quantity. The bulk of supply will be for motors and transport. The Calcutta Electric Supply Corporation at present has connected to its system over 40,000 fans, 370,000 lights, and over 1,220 motors, the latter varying from 1 horsepower to 250 horsepower in size.

The Calcutta Electric Supply Corporation gives the following data of motors in use in Calcutta:

Employment.	Number of motors.	Brake horse-power.	Employment.	Number of motors.	Brake horse-power.
Jute milling.....	19	2,136	Machine shops.....	216	1,296
Jute pressing.....	22	1,853	Pumping.....	236	603
Flour milling.....	192	2,475	Lifts.....	105	664
Printing.....	439	1,236			

IMPORTS OF ELECTRICAL GOODS.

The United Kingdom holds the great bulk of the electrical trade with India. America holds a considerable portion of the trade in fans (28 per cent), and Germany and Austria 25 per cent of the lamp trade; but on the whole the Indian electrical trade is supplied almost entirely by England.

It is interesting to see how the electrical imports are divided among the different Provinces. The following table gives the chief particulars of distribution of the imports in 1913-14:

Articles.	Bengal.	Bombay.	Madras.	Burma.
	Per cent.	Per cent.	Per cent.	Per cent.
Fans.....	61	21	5	9½
Lamps.....	45	22	11½	17
Cables and wires.....	45	38	7½	5
Other apparatus.....	39	46	8½	5
Generators.....	43	26	15	9½
Motors.....	49	27	20	2
Other machinery.....	36	47	11	5
Average.....	45½	32½	11½	8

Thus the four Provinces named above took 97½ per cent of the total electrical imports (excluding telegraphs and telephones) in 1913-14. The data on which these figures are based refer only to British India, particulars for Kashmir and other native States not being included.

ELECTRIC FANS.

The use of electric fans in India is constantly increasing, and they now have an immense importance in promoting the comfort and health of people here. It is often remarked by persons who have resided for some years in cities like Bombay that conditions of life in summer, which were formerly almost unbearable because of the great heat and closeness of the atmosphere, are now, thanks to the plentiful supply of electric fans in private houses, offices, etc., fairly comfortable. The city of Bombay for about six years, since electric fans were introduced, has been a far more agreeable city in which to live.

FANS IN THEATERS.

It is possible for theaters and churches in cities like Bombay to be open now all summer, whereas formerly, owing to the almost stifling heat, it was difficult to induce people to enter such structures in that season. The popularity of such places is now largely dependent on the number of efficient electric fans used to force circulation of the air. All the leading hotels in the chief cities of India must have electric fans in every room in order to secure and retain their patronage.

PUNKAH-WALLAHS FOR PARTIES.

The old-fashioned system of cooling rooms by fans in this country is still practiced in most communities where electric current is not available. Coolies known as punkah-wallahs work spacious fans hung from the ceilings, with ropes through a hole in the wall, the punkah-wallah doing this work outside of the room and out of sight. Sometimes at dances and big dinner parties the punkah-wallahs, dressed in picturesque costume and with huge ornamental fans, work inside the rooms, a great number being employed. For such arduous work without intermission for nine hours they are paid about \$2.60 per month. At night the punkah-wallah fanning a sleeping person will often fall asleep, too, so that the sleeping individual can get no refreshing rest. Notwithstanding the very low wages paid, the great number of punkah-wallahs who have to be employed all day and all night cause considerable expense; moreover, such human labor, not being always steady nor easily regulated, nor speedy, can not compare favorably with modern electric fans.

Ceiling fans which will operate directly over a person's bed and force air through the mosquito netting or over the dining table, or over the business man's desk are the most popular type of electric fans used in India. The table type of fans, usually attached to walls, are much used in theaters and other places of popular amusement, where it is desired to force a current of air along particular side directions. The churches usually have a great number of large fans suspended from the ceilings.

Spirit-stove fans are also used in India. These are attached to and operated by small spirit stoves, especially in country bungalows and in tents, where no electric current is available. These spirit-stove fans, often mounted on tripods, have added immensely to the comfort of trips into the jungles and in camp life generally. They can easily be packed for transport by mules, elephants, carts, or boats, as the case may be. They sell according to size from \$20 up to \$50. A leading firm dealing in these fans advertises that there are over 20,000 Europeans in India using them.

As an instance of the popularity of electric fans in India, one leading corporation (the Calcutta Electric Supply Co.) has connected to its system over 40,000 fans.

The United States is one of the most important sources of supply for the electric fans used in India. A leading firm in Bombay in the electric supply business, which deals largely in American fans, states: "There is a very big demand for all types of fans, for direct and alternating current, and for ceiling, table, desk, and wall use."

Electric lights and fans in Bombay city proper operate on a direct current, voltages ranging from 200 to 250. In the suburbs an alternating current is supplied at 230 volts, single-phase and 50 cycles. Generally speaking, therefore, electric fans must be adapted for either the direct or alternating system.

NEW COOLING DEVICES AT DELHI.

With the large amount of building necessary in connection with the new capital at Delhi, the authorities who have charge of the work are considering the possibility of constructing buildings with inner and outer walls between which artificially cooled air can be

circulated by means of exhaust fans, the cooling being effected by drawing currents of air through wetted screens. It is thought that possibly by such cooling of the walls during the heat of the day, when the buildings would for the most part be closed up, conditions of comfort might be considerably promoted. Already devices known as thermantidotes for cooling air by rapid evaporation of water are largely used in India, especially on railroad carriages. During the hot-weather months in India, especially before the breaking of the monsoon, the temperature in the shade is often 120° F. It is not unusual for the temperature in rooms to rise to 110°. It is thus evident how great is the necessity for giving special attention to cooling buildings.

SIMLA AS A MARKET FOR ELECTRICAL APPLIANCES.

In proportion to its population, Simla, the summer capital of India, and the brilliant social center of southern Asia, situated at over 7,000 feet elevation in the Himalaya Mountains, promises to become the most important market in India for electrical appliances. Since August 1, 1913, when a water-power installation of about 500 kilowatts became available for public purposes, in addition to private installations already existing at the Viceregal Lodge (residence of the Viceroy), and the official residences of the lieutenant governor of the Punjab, the commander in chief of the Army in India, and the United Service Club, the demand for electrical energy for house lighting and power in Simla has to such an extent exceeded what was anticipated that the municipal committee has already had to consider whether the existing plant should be increased.

LOW COST OF ELECTRICITY.

Electricity will be cheaper in Simla than in any other part of India; in fact, it is anticipated that it will be cheaper in Simla to use electricity than kerosene. Owing to the many different purposes for which electricity will be required and the many different types of consumers, it has been considered advisable by the municipality to adopt several alternative tariffs, each of which is best suited for certain types of consumers. One is a flat rate of 4 cents per unit for motive power only, and 2 cents, subject to a discount of 25 per cent during November, December, January, and February, for heating and cooking only, and 8 cents per unit for all other purposes, together with 33 cents per month for meter hire. Small consumers, requiring not more than 5 lamps and using electricity for lighting purposes only, pay 25 cents per 30-watt lamp installed, or equivalent, per month. Domestic and residential consumers who wish to use electricity for general purposes, such as electric irons, kettles, lighting, and heating, pay \$6.60 per kilowatt per month for all purposes for domestic use up to 2½ kilowatts only, except during November, December, January, and February, when the limit is raised to 5 kilowatts. These rates are subject to 50 per cent discount during November, December, January, and February. The reduced prices and increased limits for use of electrical current in winter are due to the population of Simla being reduced to about one-half during this season.

In a pamphlet the Simla municipality states that electrical energy can now be used for so many varying purposes that it is expected eventually to displace many of the existing methods in Simla for heating, water boiling, ironing, cooking, motive power, etc. It is strongly advised that intending consumers who propose to reside in Simla for more than one season should consider making immediate use of electricity. The following special uses of electricity for household purposes are suggested by the municipality:

For electric angethis.—This is one of the most useful pieces of electrical apparatus in existence and completely replaces the ordinary Indian charcoal angethi, but has many advantages over the charcoal angethi, enabling it to be used in addition for the following purposes for which the charcoal angethi is distinctly dangerous, owing to the noxious fumes given off: Heating rooms, warming milk in the bedroom, simple cooking operations, afternoon kettle heating in the drawing room, heating of an iron, and for use as a hot plate on the breakfast table itself. The electrical angethi is cleaner, lighter, smaller, and in every way better both in cost of operation and convenience than the charcoal angethi, which should no longer be allowed in Simla households.

For vacuum carpet sweepers.—This is one of the most successful innovations in the modern home and entirely replaces both the duster, broom, dustpan, and brush, and in Simla the bearer and sweeper. It can also be used for drying the hair after washing, drying clothes, and cleaning and dusting books, curtains, pictures, pillows, bedding, pianos, and all the other hundred and one articles forming the essentials of a home. It weighs only 10 pounds and can be used by the smallest child without inconvenience or trouble.

OTHER ELECTRICAL CONSUMING DEVICES.

Among other electrical consuming devices with appropriate capacities suggested are mentioned flame arc lamps, 1,000 candlepower; inclosed arc lamps, 500 candlepower; large regenerative lamps, 2,800 candlepower; small regenerative lamps, 1,100 candlepower; washing irons, weight 10 pounds; tailors' irons, weight 15 pounds; electrical kettles, capacity 2 pints; pair curling-iron heaters; hairbrush driers for drying the hair after washing; shaving mugs, capacity $\frac{1}{4}$ pint; cigar lighters, bed and foot warmers, saucepans of 2 and 4 pints capacity, hot plates, small radiators or heaters of 800 cubic feet, 1,500 cubic feet, and 2,200 cubic feet capacity; workshop radiators, 1,500 cubic feet; large soldering irons of $1\frac{1}{4}$ -inch capacity and small irons of $\frac{1}{2}$ -inch capacity; glue pots, $1\frac{1}{2}$ pints each; electric hand drills, $\frac{1}{4}$ and $\frac{1}{2}$ inch steel plates; ceiling fans, 60-inch blades; large desk fans, 16, 12, and 10 inch blades; electrical cooking outfits of various sizes; water boilers of 3 gallons capacity; water heaters of 25 to 60 gallons per day capacity, and small motors of 10 to 50 horsepower.

For electric cooking it is stated that two systems are in vogue, one in which every single utensil contains an electric heater and the other in which an electric stove is employed with ordinary cooking utensils. The latter system is far the cheaper and more suitable for Simla, and the information given applies to this system only. The large size is sufficient for all the ordinary cooking of a household of 3 or 4 adult persons. The medium size is sufficient for a couple, while the small size is of use only for light cooking operations. The cooking utensils suggested are large and small ovens, three sizes of saucepans, steamers, grills, frying pans, kettles, irons, and miscellaneous utensils.

Two water-heating systems are in vogue, the first in which the water is heated to its full temperature as it enters the heater and can

be used immediately, similar to the Geyser system; the second in which the water is heated slowly to its full temperature, which it maintains throughout the day. This latter is the Therol water-heating system.

Small motors may be employed for almost every purpose imaginable, from sewing machines, for which one-twentieth horsepower would be suitable, to hand drills, portable air compressors, saw benches, dentists' and hairdressers' tools, and many other purposes.

For construction of wiring systems on consumers' premises the Simla municipality has approved certain contractors and electrical engineers who may make their own arrangements with customers. These firms, therefore, will doubtless handle all the Simla business in connection with electrical supply extensions. They expect also to do a large business in electrical appliances.

The manager of one firm suggested that all kinds of electrical appliances and novelties, especially in connection with heating, would doubtless find a good market in Simla. Owing to the high elevation of the city, and its proximity to the snowy range of the Himalaya Mountains, the climate, even in summer, may require, at least in the evenings, heating appliances.

LOW VOLTAGE IN ANGETHIS IN SPECIAL DEMAND.

It is anticipated that it will cost less to heat a Simla house with electricity than with either wood, coal, or kerosene. For smaller houses, in order to lessen fire risks, the voltage will be brought down by transformers from 220 to 110 volts, so that replacements for heaters of 220 and 110 volts will be required. The municipality will supply alternating current in all cases at a frequency of 50 cycles per second and at the following pressures:

1. Single-phase, low-pressure.....	220 volts.
2. Three-phase, low-pressure.....	380 volts between phases.
3. Three-phase, high-pressure.....	2,200 volts between phases.

Except in special cases, demands for connections up to $2\frac{1}{2}$ kilowatts will be supplied from one phase only. Above $2\frac{1}{2}$ kilowatts consuming devices must be divided into two or more approximately balanced circuits and will be supplied from more than one phase.

It was mentioned that among the native population of Simla the electrical appliances known as angethis would be in great demand for heating and simple cooking. These should be equipped with quartz element disks in the middle which could be turned on a stand up and down. The stands ought not to be over 6 inches high, for the reason that the natives would like to use them as foot warmers. Natives do not sit on chairs, but squat on the floor, so that higher than a few inches would be inconvenient for resting the feet. Three kinds of electric lamps are on the market at Simla—Osrams, British; Mazdas American; and Wotans, German.

The Simla hydroelectric scheme, which thus makes possible the large use of electrical appliances at this summer capital of the Indian Empire, has been carried out for the dual purpose of supplying electric light and energy and of furnishing energy for pumping water to augment the present supply.

THE CONCRETE FLUMES.

The requisite power is being obtained by taking water from the Nauti, a tributary stream of the River Sutlej, and by leading this water down an open concrete flume to the turbines and generators. In order to divert the water of Nauti into the flume, a weir has been constructed across the stream, with its crest 2 feet above the general bed level of the stream. This weir is constructed of galvanized-iron wire crates, averaging about 5 by 5 by 5 feet each, which are filled with bowlders and are placed in a trench across the stream about 15 feet below bed level.

On the bowlder crates the weir proper has been made of concrete, faced with cut stone in cement, and over this weir all floods will pass while diverting the ordinary low-water flow into the flume head. As extraordinarily dangerous ground was met in the hillside immediately below the intake chamber, it was here found necessary to tunnel straight through this into the hillside and come out some 800 feet downstream, clear of floods and bad ground. The concrete flume proper here commences. This flume is 4 by 2 feet and it winds along the hillside at a slope of 1 in 1,000 for about 1 mile, where it pierces through a promontory by a tunnel 7 by 6 feet cut out of the solid rock. This tunnel gave great trouble during construction, owing to the lack of skilled labor and the difficulty in getting down suitable drilling plant to the inaccessible spot where it is situated.

After emerging from this tunnel the flow continues in the open flume for about another mile to a large reservoir to hold an 8 hours' full working supply of 6,250,000 gallons, which has been constructed on a suitable spur. The flume where it crosses a small creek called the Jaori passes through a reinforced-concrete box girder of 30 feet clear span resting on dry stone masonry abutments, and it is also covered over in places where it has been considered that the hillside above was dangerous and likely to slip. Three settling tanks, provided with suitable parabolic scour outlets, have been constructed at intervals along the flume line to intercept all silt which might be brought down with the water, and in the large storage reservoir arrangements are provided for scouring out the silt. Also, at certain selected spots where the hillside permits, overflows have been provided which would come into action if the flume were damaged and blocked in any way.

From the flume-proper terminus at the storage reservoir the water is led to the head of the penstock pipes through a reinforced concrete pipe, 40 inches in diameter, which is buried in a track about 1,000 feet long. At the end of this reinforced-concrete pipe the headstock chamber is constructed, and out of this the 6 steel penstock pipes, 16 inches in diameter, lead down to the power house, which is 545 feet below. The headstock chamber is 17 feet long by 8 feet wide and 22 feet deep, constructed of reinforced concrete of cantilever and slab construction, the slabs varying in thickness from 4 inches at the top to 8 inches at the bottom and from 4 to 6 foot span.

POWER HOUSE—OTHER TOWNS SUPPLIED.

The power house is designed in two complete halves and also arranged to permit an extension being added when required, but at ~~the time of writing~~ ^{when} ~~have been~~ ^{had been} installed. Each

half of the power station will contain three Pelton wheels, coupled direct to a three-phase alternator of 250-kilowatt capacity at a speed of 500 revolutions per minute, a voltage of 2,200 volts between phases, and a frequency of 50 cycles per second. These alternators are excited by two direct-coupled excitors, mounted on the ends of the shafts of the two center machines for starting operations, and also from a separate motor-driven exciter set. Power is conveyed from each alternator to the power-house switchboard through three-phase rubber cables and from the bus bars power will be taken through oil-switch panels to a set of three 250-kilowatt single-phase, step-up, oil-cooled transformers, which will be situated in a separate transformer room where the voltage will be stepped to 15,000 volts.

The smaller town of Chair, a few miles away, also receives electric power from this system. The transmission line to Simla is about 9 miles long and the one to Chair about 12 miles long; while a third line is being laid from Simla to Chair, $7\frac{1}{2}$ miles long. This system of transmission lines, forming a triangle, gives the advantage of sending current round any two of them should any one of the three be broken. The Chaba-Simla and the Simla-Chair lines are supported on wooden structures, with short spans up to 15,000 feet, while the Chaba-Chair line is supported on steel structures, with spans averaging 1,000 feet, with a maximum of 3,500 feet. All the lines are composed of three copper wires spaced 4 feet apart in a triangle and are protected at points where trouble from lightning is anticipated by superimposed steel earth wires and on spans. The structures also carry telephone wires, which run to all points where needed. The poles for street lighting will be fitted with one or two tungsten filament lamps, controlled at suitable spots by hand or automatic time switches. These lamps will be of 60 to 80 candle-power.

AUTOMATIC TELEPHONE.

Remarkable results are being obtained with the automatic telephone introduced at Simla. The new system has already become so popular that enough additional subscribers have come in to pay a considerable portion of the interest and sinking-fund charges on the capital expended in making the change and taking the saving effected in telephone operators' pay into account. The experiment must be considered not only as already paying its way but as promising to be a source of profit to the telegraph department. Under these circumstances, in view of the very great convenience the automatic system affords, the question of extending its use to other stations is being taken up, and it is understood that an experiment similar to the one at Simla will be tried in one of the smaller plain stations with a view to ascertaining whether the system will work as well in the heat as it is doing in the cooler climates of the hills.

ELECTRIC-WIRING DEVICES IN BOMBAY.

[By Consul Edward J. Norton, Bombay.]

The new houses in Bombay show considerable improvement over the older structures from an architectural standpoint and are planned more in accordance with sanitary requirements. There are, however, few, if any, fireproof buildings in the city. In the native quarter, or bazaar district, wooden buildings predominate, and in many of the

new structures, on account of the increased cost of building material and the high wages for labor, safety and durability have been less considered than a high return upon investment.

In the city proper business structures and residential apartment houses and all public edifices are built of stone. Steel construction, as it is known in the United States, has not been introduced here except in warehouse erection.

WIRING SYSTEM.

Lights and fans operate on a 230-volt direct-current three-wire earthed return. The suburbs of Bombay are supplied with an alternating-current installation of 230 volts. Under the system of electric wiring commonly employed here and found to be most suitable for general installation the wires are carried over the surface of walls or ceilings on hardwood cleats; the latter are separated by 2-foot spaces and the whole is inclosed in a teak or oak casing. Wire contact with the wall surface must be carefully avoided or the installation will require renewal in about two years. In this heavily saturated atmosphere the trap and porous lime building stone so largely used in Bombay absorbs a great deal of moisture and the leaching process which quickly follows seriously damages electric installations unless the walls are thoroughly protected.

Conduit-wiring systems that involve burying the wires in the wall or ceiling have been tried, but found unsatisfactory for general purposes. For the wiring of governmental and municipal buildings the contract specifies insulated steel-armored conduit, but the work is carried over the wall surface. Noninsulated conduit work has been put into the majority of mills. Dealers state that an improved system that would lower the present cost of wiring would find a ready sale if it met all tests. In this regard mention may be made of a new wiring system introduced into Bombay last year by the W. T. Henley Telegraph Works (Ltd.), of England. Many public and business buildings have been wired with it. The Henley method is stated to compete in cost with the common cleat system, and it also is claimed to work out cheaper than the conduit method, both on account of the low cost of material and reduced labor expenses for erection.

TRADE CONDITIONS—PRICES—IMPORTS.

Conditions in the electric specialty or electric-light supply trade are far from satisfactory. There are in Bombay at least 100 dealers, many of whom claim to be electrical engineers, and the overcrowding in this line is partly responsible for an extended system of price cutting. The most reliable and old-established European firms of electrical engineers are keenly feeling the competition of native firms, and while the volume of trade is large, it is being handled at present on a dangerously low margin of profit. The dealers are steadily reducing the quality of stock carried in order to meet the demand for low-priced material. The United Kingdom furnishes over three-fifths of the electrical supplies imported into western India. Germany and Austria have a small but slowly growing share of the trade, while Belgian, French, and Italian manufacturers have all lost ground in the past five years.

There is practically no direct trade in this line with the United States, and the principal firms among the local dealers manifest very little interest in American-made electric-light material. They are inclined to argue that American goods are too high-priced for the market, and in discussing this point the writer was told that the manufacture of British electrical merchandise has been so developed and the cost of production so reduced that German manufacturers were finding it difficult to meet their competition. But probably the chief obstacle in the way of American trade development is distance from the market. Goods ordered from London are received at Bombay in 10 to 11 weeks; at least twice that time would elapse before the arrival of goods ordered from America.

The sockets in use throughout western India are of the bayonet-cap type, a half turn locking the lamp in its receptacle. Rotary and push-button switches are carried in stock, but dealers state that the demand runs almost exclusively to switches of the tumbler type. Pendent switches have a very limited sale.

ELECTRIC ELEVATORS IN BOMBAY.

The increasing number of electric lifts in the Bombay Presidency is referred to in a press note issued by the Bombay Government, which has announced that it will lend the services of electrical inspectors to insure greater safety. The press note states: "Since the introduction of electric power the number of lifts in the Bombay Presidency has considerably increased and the rate of increase will undoubtedly be much more rapid in the future. In Bombay the principal hotels and offices, the larger shops, and most of the recently constructed flats and several private houses are now fitted with lifts."

ELECTRICAL DEVELOPMENT IN BURMA.

[By Consul Maxwell K. Moorhead, Rangoon.]

Electrical development in Burma is in its infancy. Outside of Rangoon and Mandalay there are no electric plants, except a small lighting set in the oil fields at Yenangyoung operated by the Burma Oil Co. There are practically no privately owned isolated plants in Burma, due probably to the high cost of erection and the very small population able to afford electric light and power. At present kerosene is the almost universal medium of lighting, the poorer natives using Burma oil and the Europeans and wealthy natives American kerosene. While there is no doubt that eventually electric plants will be erected in the more important towns of Burma, little development can be expected during the present distressed condition of trade.

The only electric plant in Rangoon is operated by the Rangoon Electric Tramways & Supply Co., which has 3,000 residence connections. Its rates are 14 cents per British Board of Trade unit for lighting, 12 cents per unit for combined lighting and power for fans, and 7 cents per unit for power. To Government railways and other large consumers special rates are given, which average 6 cents per unit. This company also deals in electric supplies of all kinds. The Burma Electric Tramways & Lighting Co., Mandalay, has 150 residence connections; rates for lighting are 16 cents for the first 30 units per month, and 14 cents for the next 170 units.

Electric fans, both ceiling and wall, are coming into more general use and are replacing the hand-operated Indian punkahs. Nearly all offices in Rangoon are now equipped with electric fans; also clubs, places of amusement, churches, and the residences of the European community. Practically the only competitor of the United States in this market, in the sale of electrical supplies, is Great Britain, which furnishes four times as much as does America. American manufacturers should be able to supply large quantities of lamps, cooking and heating apparatus, torches, motors, generators, etc.

ELECTRIC-LIGHT PLANTS.

The following compilation of data regarding the electric-light plants of India and Ceylon was made by the Engineer, of London, England, in February, 1914:

Bangalore, India.—Owned by the Mysore Government; opened, July, 1902; C. F. Beamos, engineer in chief. Alternating, 3-phase generation at 2,200 v., step-up to 35,000 v., trans. over 92 miles, and tr. down 2,300 v. for Kolar gold fields; frequency per second, 25; station voltage 2,300; consumers' voltage 2,300 power and 220 lights. Connec. to mains, 9,500 and 5,150 k. w. Total capacity plant, 9,700 k. w. No boilers. Generating sets—power (1,200 h. p.) supplied from Cauvery Falls. Price, 5 to 6 cents per unit for lighting; 1 to 6 cents for power.

Barrackpore, Bengal.—Owned by the Barrackpore Electric Supply Co.; opened, 1906; L. H. B. Sandwell, engineer in chief. Continuous, 3-wire; station voltage 485-445; consumers' voltage 220 lights, 440 power. Connec. to mains, 190 h. p. motors. Total capacity plant, 88 k. w. Consumers, 107. Two Stirling (5,000 lb.) boilers. Generating sets—two 30 k. w. dynamos and two Alley McLellan engines, and 12 k. w. Tudor battery (for morning shift). Price per unit, 16 cents (with 20 per cent discount for cash) for lighting; 5 cents for power.

Bikaner, India.—Owned by the Maharajah of Bikaner; opened, 1903; D. B. Webbe, engineer in chief and resident engineer (State elec. eng.). Alternating, 3-phase for power, single-phase for lighting; frequency per second, 50; station voltage 2,000-2,100; consumers' voltage 200 and 220. Total capacity plant, 480 k. w. Consumers, 250. Economic boilers. Generating sets—Siemens-Willans sets. Price per unit, 8 cents for lighting; 4 cents for power.

Bombay, India.—Owned by the Bombay Electric Supply & Tramways Co.; opened, October, 1905; C. W. G. Little, engineer in chief; C. D. Baker and C. N. Moberly, consulting engineers. Alternating and continuous, 3-phase, transformed at substations to direct currents, motor gens., 3-wire, and to 3-phase, 4-wire at static substations; frequency per second, 50; station voltage, 5,500; consumers' voltage, 230 and 460 d. c., 230 and 400 a. c. Connec. to mains, 11,295 k. w. (excl. tr.). Total capacity plant, 7,000 k. w. Consumers, 4,283. Boilers 14 B. & W. (each about 19,000 lb.). Generating sets—three Brush steam alternators and three Brush-Parsons turbo-alternators of 7,000 k. w. aggregate. Price per unit, 9 cents (with discount) for lighting; 4 cents for power, with special rates to large consumers.

Bombay, India.—Owned by Tata Hydroelectric Power Supply Co.; A. Dickinson & Co., consulting engineers; H. P. Gibbs, engineer in chief. Alternating, 3-phase, 43 miles tr. at 10,000 v. underground di-tubs. (power scheme); frequency per second, 50; station voltage, 5,000; consumers' voltage, 2,200. Connec. to main, 30,000 k. w. Total capacity plant, 38,000 k. w. Consumers, 30. No boilers. Generating sets—four 9,600 k. w. Siemens 3-phase generators driven by Escher, Wyss water turbines.

Calcutta, India.—Owned by Calcutta Electric Supply Corporation; opened, 1899; Kennedy & Jenkin, consulting engineers; R. E. Winkfield, engineer in chief. Alternating and continuous; D. C. 3-wire distrb. 3-phase and motor converters; frequency per second, 50; station voltage, 450 continuous, 5,000 alternating; consumers' voltage, 2,225 and 6,000. Connec. to mains, 16,926. Total capacity plant, 7,533 k. w. Consumers, 5,682. Boilers, 19 B. & W. (186,000 lb.). Generating sets—Willans-Crompton, Parsons-Crompton, Bellis-Crompton, Willans-Siemens, and Crossley-Crompton sets of 7,533 k. w. aggregate. Lea recorders (5 sets) installed. Price per unit, 16 cents for lighting; 10 cents for power.

Cauvery Falls (Sivasamudram, Mysore, India).—Owned by the Mysore Government; opened, July 1902; C. F. Beames (chief elec. eng. to Mysore Gov't., Bangalore). Continuous and alternating, 3-phase gen. at 2,200 v. stepped-up to 78,000 v.; long distance trans. to Kolar gold fields for power 92 miles, 65 miles to Bangalore, and 40 miles to Mysore City for light and power. Frequency per second, 25; station voltage, 2,200, 78,000, and 35,000; consumers' voltage, 2,200 and 220. Connec. to mains, 12,000 k. w. Total capacity plant, 9,709 k. w. Generating sets—11,720 k. w. Gen. Elec. (N. Y.) 3-phase gens., driven by Escher Wyss 1,250 h. p. turbs. and one 2,700 h. p. 1,500 k. w. unit; current supplied for light and power in Bangalore, Mysore, gold mine, etc. ($3 \times 1,500$ k. w. G. E. C.—Escher Wyss sets on order). Price per unit, 6 cents for lighting, 4 cents for power.

Cawnpore, (United Provinces, India).—Owned by Indian Electric Supply & Trac-tion Co.; opened, January, 1907; P. G. Moore, engineer in chief. Continuous, 3-wire; station voltage, 450; consumers' voltage, 450 and 225. Connec. to mains, 960. Total capacity plant, 855 k. w. Consumers, 500. Boilers, 3 wtr.-tube (20,000 lb.). Generating sets—five Bellis-Crompton sets of 855 k. w. aggregate (2 batteries of storage cells). Price per unit, 12 cents for lighting, 4 cents for power and sliding scale.

Colombo, Ceylon.—Owned by Colombo Electric Tramway & Lighting Co.; opened, 1896; L. H. Combe, engineer in chief and resident engineer. Alternating and continuous, s. phase 2-wire; d. c. 3-wire; frequency per second, 60; station voltage, 2,000 and 440 d. c.; consumers' voltage, 100 and 220. Connec. to mains, 2,900. Total capacity plant, 2,000 k. w. Consumers, 850. Boilers, B. & W. (140,000 lb.). Generating sets—one 350 k. w. Lancs. dynamo and Diesel set, 6 G. E. C. (N. Y.) gen. sets (270 k. w. and one 150 k. w. a. c., one 150 k. w. d. c.; one 200 k. w., one 100 k. w., one 300 k. w. a. c.) and one 75 k. w. E. C. C. Belliss d. c. set, one 300 k. w. Dick, Kerr gen. and Belliss eng., and one 270 k. w. Dick, Kerr d. c. and M. A. N. Diesel eng. Price per unit, 8 to 16 cents for lighting; 3 to 8 cents for power.

Dacca, Bengal.—Owned by Dacca Electric Light Trust. Continuous, 3-wire; station voltage, 500; consumers' voltage, 250 and 500. Total capacity plant, 600 k. w. Three Marshall boilers. Generating sets—four Parker-Belliss sets of 600 k. w. aggregate.

Darjeeling, India.—Owned by Darjeeling municipality; opened, December, 1897; Geo. P. Robertson, engineer in chief. Alternating, 8 transformer substations, overhead bare wire conductors, 2-wire; frequency per second, 83; station voltage, 2,300; consumers' voltage, 220. Connec. to mains, 602. Total capacity of plant, 390 k. w. Consumers, 550. No boilers. Generating sets—two 65 k. w. Crompton, one 130 k. w. General Elec. and one 130 k. w. Brush alternators (driven by Gunther water turbines) of 390 k. w. aggregate. Price per unit, 8 cents for lighting; 2 cents for power; 1 cent for heating (in winter).

Delhi, India.—Owned by Delhi Electric Tramways & Lighting Co.; opened, June, 1908; Kincaid, Waller Manville and Dawson, consulting engineers; J. G. Griffin (M'g'r), engineer in chief. Continuous, 3-wire system, overhead mains. Station voltage, 510 and 535; consumers' voltage, 250. Connec. to mains, 1,153 (and 882 h. p. motors). Total capacity plant, 525 k. w. Consumers, 1,115. Two Cornish, three Stirling (20,000 lb.) boilers. Generating sets—3 Browett-Peebles sets of 360 k. w. aggregate, and one 165 k. w. Diesel oil engine set (also battery of 260 Tudor cells of 360 amp-hours). New plant being installed. Price per unit, 12 to 16 cents for lighting; 3 to 6 cents for power.

Fort William, Bengal.—Owned by Military Works Department; opened 1904; J. C. H. Morby, consulting engineer and engineer in chief. Continuous, 3-wire, bare overhead mains; station voltage, 440; consumers' voltage, 220 and 440. Connec. to mains, 220 k. w. Total capacity plant, 200 k. w. Four loco. 10,000-lb. boilers. Generating sets—one 40 k. w. and two 80 k. w. Allen-Siemens set. Price per unit, 8 cents.

Hyderabad, Deccan, India.—Owned by the Nizam's Government; opened, January 1910; R. L. Gamlen, engineer in chief. Alternating, 3-phase; frequency per second, 50; station voltage, 3,300; consumers' voltage, 400. Connec. to mains, 920 k. w. Total capacity plant, 1,170 k. w. Consumers, 371. Four B. & W. one Lancs. and 3 small loco. boilers. Generating sets— 2×500 k. w. Dick, Kerr-Belliss, 1×50 k. w., and 1×120 k. w. Bruce, Peebles-Marshall sets. Price per unit, 12 cents for lighting; 6 cents for fans; 4 cents for power.

Kandy, Ceylon.—Owned by Colombo Gas & Water Co.; opened, February, 1900; Jas. H. Chick, engineer in chief. Continuous, 3-wire; station voltage, 420; consumers' voltage, 200. Connec. to mains, 260 k. w. Total capacity plant, 320 k. w. Generating sets—four Belliss-Parker sets of 50 k. w. each, one 60 b. h. p. Hornsby oil

eng. driving 40 k. w. Parker dyn., and one Diesel engine dir. coupled to 80 k. w. G. E. C. dyn. Price per unit, 22 cents for lighting, 12 to 20 cents for power.

Kashmir, India (Jhelum power installation).—Owned by the Maharaja of Kashmir; opened, October, 1908. Alternating, 3-phase generator and distribution, long distance transmission at 60,000 volts. Frequency per second, 25; station voltage, 2,300; consumers' voltage, 2,300. Connec. to mains, 4,500 k. w. Total capacity plant, 4,000 k. w. Consumers, 3. No boilers. Generating sets—four 1,000 k. w. G.E.C. alternators and Abner Doble water wheels. Power house at Mohora, 21 miles from Baramoola substations (energy used for dredging), and 55 miles from Srinagar (silk factory). Transmission of 3-phase current at 60,000 v., elec. lighting of Srinagar commenced (system 3-phase, 50 alternating). Price per unit, 12 cents for lighting, £8 (\$38.93) per h. p. per annum for power.

Khargpur (India) railway workshops and settlements.—Owned by Bengal-Nagpur Railway Co.; opened, November 1903; Sir John Wolfe Barry, K. C. B., consulting engineer. Continuous and alternating, 3-wire underground feeders, overhead distribtrs., 2-wire underground d. c. workshops, bare overhead 3-phase waterworks. Frequency per second, 18; station voltage, 220, 250, and 2,200; consumers' voltage, 220. Connec. to mains, 3,800 k. w. Total capacity plant, 1,360 k. w. Six Lancs. (40,000 lbs.) boilers. Generating sets—one Belliss G. E. C. 500 k. w. and four Belliss-Siemens sets of 200 k. w. each, and one set Belliss-Siemens of 60 k. w. (double current generators). Price per unit, 2 cents.

Kolar gold field, India.—Owned by Kolar Mines Power Station (Ltd.); opened, 1904; F. M. Nicholl, engineer in chief. Alternating, 3-phase power, single-phase lighting; frequency per second, 25 and 50; station voltage, 3,300 and 2,200. Total capacity plant, 2,600 k. w. Four B. & W. boilers. Generating sets—3-phase and single-phase altrs. (Allen-Westinghouse); Gen. Elec. (N. Y.) motor generators; 4,000 amp. hours Tudor battery.

Lahore, India.—Owned by Northwest State Railway; opened, June, 1907; G. E. Wright, engineer in chief. Continuous, 3-wire overhead conductors. Station voltage, 480; consumers' voltage, 440. Connec. to mains, 2,400 p., 80 l. Total capacity plant, 1,500 k. w. Three B. & W., 4 Stirling boilers. Generating sets—4 Howden-Lancashire dynamo sets of 750 k. w. aggregate, and two sets of 750 k. w.

Lashkar, Gwalior, India.—Owned by the municipality; opened, December, 1905; R. W. McClay, engineer in chief. Continuous, 3-wire, overhead mains; station voltage, 460; consumers' voltage, 225. Connec. to mains, 210 k. w. Total capacity plant, 320 k. w. Consumers, 250. Two B. & W., two loco. boilers. Generating sets—2 vert. comp. engines and multipolar dynamos. Price per unit, 6 cents.

Lucknow, India.—Owned by Oudh & Rohilkund Railway Co.; opened, 1906; Continuous, 3-wire. All current used for power and lighting shops. Station voltage, 460 and 500; consumers' voltage, 440. Connec. to mains, 950 k. w. Total capacity plant, 900 k. w. Generating sets—3 Willans coupled to 2 Bruce Peebles and 1 Westinghouse dyns. of 450 k. w. aggregate for loco. shops; also three 150 k. w. Belliss-Westinghouse sets for carriage and wagon shop.

Madras, India.—Owned by Madras Electric Supply Corporation; opened, August, 1909; Merz & McClellan, consulting engineers; E. C. St. John, engineer in chief. Continuous and alternating, d. c., three-wire distribution; 5,000 volts, a. c. transformer substations. Frequency per second, 25; station voltage, 500 and 5,000; consumers' voltage, 225 and 450; connec. to mains, 3,120 k. w. Total capacity plant, 3,500 k. w. Consumers, 1,095. Five Stirling boilers. Generating sets—five 500 k. w. (3 d. c., 2 a. c.) and four 250 k. w., (2 d. c., 2 a. c.) five Davey Paxman-Crompton C. C., and four Davey-Paxman Crompton A. C. sets; 230 Tudor cells of 450 amp. hrs. Price per unit, 8 cents (with discounts) for lighting; and 2 cents for power, or \$2.60 per kilowatt month for power.

Mysore, India.—Owned by the Mysore Government; opened, August, 1902; C. F. Beames, engineer in chief. Alternating, 3-phase gen., long-distance transmission from Cauvery Falls; house lighting s. ph., 60 alternating, 3-wire; frequency per second, 25, 60s; station voltage, 2,200, 35,000; consumers' voltage, 2,300 (pr.) 220 (lt.). Connec. to mains, 9,600. Total capacity plant, 9,700 k. w. No boilers. Generating sets—power supplied from Cauvery Falls and used for mining, mills and factories, street lighting, etc., in Bangalore and Mysore. Price per unit, 5 cents for lighting, 1 to 5 cents for power.

Rampur City, India.—Owned by Rampur State; opened, November, 1898; D. N. Mallik, A. M. I. E. E. (State elec. eng.); J. C. Paul (aast. eng.). Continuous 2-wire overhead mains; station voltage, 235; consumers' voltage, 220; connec. to mains,

123 k. w. Total capacity plant, 141 k. w. Boilers, Marshall locos. Generating sets—three 18 k. w. and one 32 k. w. Belliss-Parker, one 38 k. w. Belliss-Crompton, and one 10 k. w. and one 7 k. w. Marshall-Parker sets. Price per unit, 8 cents for lighting.

Rangoon, Burma.—Owned by Rangoon Electric Tramways & Supply Co.; opened, December, 1907; J. L. Dyson, engineer in chief and resident engineer. Alternating, 3-phase 4-wire from substations; frequency per second, 50; station voltage, 2,300; consumers' voltage, 115 and 200, 500 tr. Total capacity plant, 5,400 k. w. Six B. & W. water tube boilers. Generating sets—Curtis turbines of 5,400 k. w. aggregate and one Belliss B. T.-H. tramway set of 500 k. w. and motor gen. of 800 k. w. (Simmance-Abady CO₂ recorder installed). Price per unit, 14 cents for lighting; 12 cents for comb. lighting and fans; 6 to 7 cents for power.

Simla, India.—Owned by municipality; opened, April, 1911; Capt. B. C. Battye, R. E. consulting engineer and engineer in chief; F. Milne, resident engineer. Alternating, 15,000 v. trn. Delta overhead mains of 2,200 v., stepped down to 220 v., 4-wire; frequency per second, 50; station voltage, 2,200 and 15,000; consumers' voltage, 220 and 382; connec. to mains, 780 k. w. Total capacity plant, 750 k. w. Consumers 270. No boilers. Generating sets, 3 Pelton wheel sets, each of 250 k. w. (power mainly used for pumping). Price per unit, 8 cents for lighting; 1½ to 4 cents for power.

Srinagar, India.—Owned by the Maharja of Kashmir State; opened, 1910 and 1914; L. C. Bose, engineer in chief. Alternating, current purchased in bulk, 3-phase 3-wire distn. from 3 substations; 3-phase distn. from 8 tr. stations; frequency per second, 48 and 25; station voltage, 2,300 and 2,200; consumers' voltage, 220. Connec. to mains, 300 k. w. Total capacity plant, 500 k. w. Consumers, 600. No boilers. Generating sets—2 (100 and 200 k. w.) Westinghouse motor generators at Basant Bagh, Srinagar 25 alternating transformers. Price, 16 and 18 cents per 16 candlepower, or 10 to 12 cents per unit, for lighting; £8 (\$38.93) per h. p. yr. (or £4 (\$19.46) per h. p. yr. for 12 hours' supply) for power.

WATER-POWER PROJECTS.

TATA HYDROELECTRIC ENTERPRISE.

By far the most important hydroelectric undertaking ever projected in India is being carried out at an estimated cost of \$8,000,000 in the Bombay Presidency by the Tata Hydroelectric Power Supply Co. (Ltd.). It will provide about 60,000 horsepower and will be supplying energy by February, 1915.¹ Contracts have been signed for supplying power to 31 cotton mills and 3 flour mills in Bombay, these factories to take from 200 to 2,000 horsepower each. This will result in a great saving in operating cost, as these mills now use about 60,000 horsepower generated by steam. The scheme owed its inception and organization to the late Mr. Jamsetjee Tata, the most enterprising capitalist and industrial promoter India has ever known. The financing of this enterprise, to which nearly \$1,000,000 was contributed by the royal families of Hyderabad, Mysore, and Baroda, was largely assisted by the wealthy Parsi community in Bombay.

The Tata hydroelectric project is the largest in the world. Power will be obtained from two great reservoirs, about 80 miles northeast of Bombay City, known as the Lonavla and the Wahlwan, having a storage capacity of 380,000,000 and 2,800,000,000 cubic feet, respectively. The water will be led by a masonry duct to the forebay, 2,040 feet above sea level, whence it will enter steel pipes leading to the turbo-generators at the power house below, the head being 1,730 feet, or ten times as great as that of Niagara, and the static pressure 680 pounds to the square inch. The generating plant will be erected 300 feet above sea level. The Lonavla Dam will store water during the rainfall, estimated to average 175 inches, thus insuring a continuous supply for the generating plant 2,000 feet below, while the Wahlwan Dam will provide a storage reservoir for the rest of the year. The latter is situated near Wahlwan village, about 1½ miles from Lonavla station. The Wahlwan Dam is 4,500 feet long and about 68 feet high, while the area of the lake is nearly 1,540 acres, or about 2½ square miles, with a capacity of 2,800,000,000 cubic feet. Later on a third lake, to be known as the Shiratwa Lake, may be constructed in a valley beyond Wahlwan Lake, with which it will be connected by a tunnel nearly a mile long running through the dividing ridge of steep hills which will form the watershed some 1,200 feet above the level of the valley. This lake will also be held up by a large masonry dam 8,000 feet long, its greatest height above the foundation being 93 feet, thus forming a very capacious reservoir for nearly 7,000,000,000 cubic feet of water, with an area of 3,174 acres, or nearly 5 square miles. The transformers for this plant are being furnished from Schenectady, N. Y.; the insulators, transmission lines, underground cables, etc., from both England and Germany; the pipe lines from Switzerland; and the hydraulic turbines (Pelton type) from California.

¹ The first power from the Tata hydroelectric enterprise was switched on by the governor of Bombay on Feb. 3, 1915. Up to that date the enterprise had cost \$2,000,000.

The receiving station, with distributing and sub stations, will be in close proximity to Bombay's cotton mills and railway workshops. The current will be supplied to local industries at a pressure of 200 to 3,000 volts. In Bombay the current will be supplied from underground cables, two-thirds of which are already laid and ready for service.

ELECTRICAL EQUIPMENT FOR BOMBAY FACTORIES.

The completion of this great hydroelectric enterprise early in 1915 should greatly stimulate the already large demand for electrical equipment and machinery of all kinds in the vicinity of Bombay. The conversion from steam to electric drive of cotton mills and other factories of Bombay to utilize the new cheap power is now in progress under the supervision of the general manager of the hydroelectric scheme. The motors will be of the Westinghouse "AIF" slip-ring protected type suitable for double drive and for 3-phase current at 2,000 volts and 50 periods. At present a total of 207 motors of this type have been ordered, the sizes ranging from 50 brake horsepower to 500 brake horsepower. The motor speeds are 290 and 365 revolutions per minute, there being several of each horsepower capacity at these speeds. With regard to the drive, the motors will be coupled direct to the line shaft in a great majority of cases without the intervention of countershafting. The motor-switch pillars are of the Westinghouse ironclad type S pattern, which are largely used in mining and other industrial work, the starting being effected by liquid controllers. The transformers are 3-phase, oil-immersed, self-cooled units and reduce the supply from 6,000 volts to 2,000 volts k. v. a. from the motor. They number 64 in all and are of four sizes, namely, 22 of 500 k. v. a., 14 of 600 k. v. a., 21 of 700 k. v. a., and 7 of 900 k. v. a.

CAUVERY FALLS.

India possesses large water-power resources, the gradual utilization of which is one of the phases of its industrial development. The first hydroelectric installation in India was carried out in 1896 for the municipality of Darjeeling, in the northeastern Himalayas. An important development is at the Cauvery Falls, in the Native State of Mysore, that was constructed in 1900, at a cost of \$2,866,667. From this installation 10,000 horsepower is transmitted 92 miles to the Kolar gold fields, and about 2,000 horsepower to the cities of Bangalore and Mysore, where it is used for electric lighting and industrial purposes. An extension, now under construction, will increase the power available for the gold mines at Kolar by 7,000 horsepower and will increase, to a lesser extent, the power used in the factories in Bangalore. The cost of this extension will be about \$466,700.

AMERICAN MACHINERY SELECTED.

All the electrical equipment for the new installation will be manufactured in the United States. A contract has been signed for the purchase of two 1,500-kilowatt generators, twenty 1,750-kilowatt high-voltage transformers, and a switchboard gear, to be supplied by a Schenectady, N. Y., firm, at a cost of about \$150,000. Leading electrical firms in England and Germany bid against the American

firms on this equipment; but the English bids were about 20 per cent higher than the accepted bid of the American firm, and in the case of German firms their guarantees were not considered as satisfactory as those of the American firm. The new turbine installation, as in the original plant, comes from Zurich, Switzerland.

An interesting feature of the new high-tension line installation will be the use of iron poles with crossarms having porcelain insulators, which are to be supplied from Pittsburgh, Pa., at a cost of \$200,000. This iron-pole construction is deemed advantageous on account of the white-ant difficulty with timber, and also because of local scarcity of tall enough trees for poles.

SUCCESSFUL AMERICAN ENGINEERING—PROFITABLE PLANT.

The first Cauvery Falls water-power scheme was at the time of its inception one of the most important long-distance transmissions in the world. It attracted special interest in the United States as one of the first notable instances of the participation of American manufacturers and American engineers in so great a project so far away from home. This scheme was originally carried out and has always been managed by American engineers appointed by the Government of Mysore. The electrical equipment, which has always proved most satisfactory, was all manufactured in the United States. The present electrical engineer in charge, who will direct the new installation, is Mr. C. F. Beames, of New York State.

Exceptional financial results to the Mysore Government have followed this undertaking. The original capital outlay has now been practically covered by subsequent profits. The plant is now netting in earnings about \$500,000 a year. The charge to customers for power is about \$50 per unit horsepower per year. A large augmentation of profits is anticipated from the additional installation.

DAMS AND RESERVOIRS FOR IRRIGATION.

There is also to be a large expenditure, of about \$2,666,667, on a huge dam and reservoir across the Cauvery River at the town of Kannambadi, about 15 miles from the city of Mysore. This is to be used for increased water power and for irrigation.

WATER POWER IN PATELAWA AND KASHMIR—MINOR PLANTS.

The State of Patiala is equipped with a hydroelectric installation for city lighting, power supply, and waterworks. The current is conveyed 18 miles from the generating station, the plant for which was supplied by an English firm, as was the hydroelectric plant at Simla. A hydroelectric plant in Kashmir, in northwestern India, which contains four double water-wheel units with automatic-pressure governors, each unit capable of delivering 1,765 horsepower to the shaft under an effective head of 400 feet, with four alternators each rated at 1,000 kilowatts, received all its electrical machinery and its hydraulic apparatus from American firms.

Among minor installations are a small hydroelectric station at Mussoorie, in the United Provinces (in the Himalayas); a station of the cordite works at Wellington, in the Nilghiris Hills, in southern

India; stations at Munnar and Gokak, in southern India; and a plant owned by the Government of Nepal, an independent State in northern India, in the Himalayas. A plant being erected near Kabul, in Afghanistan, is being supplied with generating machinery from the United States.

POSSIBILITIES OF DEVELOPMENT.

While the hills and mountains of India have enormous sources of water power, yet there is usually the commercial difficulty of finding markets for such power if developed on a large scale. In connection with some of the important irrigation works of India, big dams are already constructed, and water power could be developed at comparatively small cost were manufacturing industries near by to utilize it. Moreover, while the water supply during the monsoon might be almost unlimited, it could be made sufficient during dry periods only by increased storage facilities. There are, however, many places about India where water power might be advantageously produced, and there have been schemes suggested, though not yet carried out, for transmitting water power over considerable distances to Calcutta and to Madras.

Mr. J. H. Abbott, a member of the Imperial Legislative Council of India, who has been a contractor for many important irrigation projects, thinks that an extensive water-power scheme could be advantageously developed near Jhansi, in the United Provinces. It would supply not only industries in the neighborhood, but also the great cotton, woolen, and leather factories of Cawnpore, about 100 miles distant, which now use steam power. He stated that on the River Betwa, near Jhansi, there are two irrigation dams already constructed for the Government of India. Over these dams during four months of the year, when the river is in flood, more water passes than goes over Niagara Falls, while during the rest of the year, with some extra attention paid to storage, there should be enough water to develop power for all the industries of the United Provinces. On the Darsan River, a few miles away, there are two more dams, 2,000 feet long by about 40 feet high. The proposed scheme was to utilize both these rivers.

As land is cheap in the neighborhood, costing only about \$5 per acre, new industries might be started, such as granite works to develop the fine grade of stone which is found here in large quantities and which might supersede, to a large extent, the Aberdeen granite now imported; and tinning factories to preserve the meat of the numerous domestic and wild animals. At Jhansi the large railway workshops could take the power, but Cawnpore would furnish the most extensive market.

LIME FOR FERTILIZER.

American manufacturers might find the Himalaya Mountains, especially Kashmir, where water power is already developed, a good field for the establishment of a lime-nitrogen fertilizer industry, since there are large deposits of lime and the fertilizer could be used for the great agricultural districts in the plains of the Punjab and the United Provinces.

FOREIGN TRADE STATISTICS.

The foreign trade of India has more than doubled in the past 30 years. In 1884 it had a total volume of \$752,337,000, including treasure, Government stores, and trade by land, while the aggregate in the fiscal year 1913-14 was \$1,653,549,000. Imports of merchandise alone increased from \$256,484,000 to \$629,740,000, those from the United States increasing during that interval from \$2,575,000 to \$15,542,000.

The following tables give the value of the sea-borne trade excluding treasure and Government stores, of British India by countries, the values of the principal articles purchased and sold by India, and the details of India's trade with the most important countries:

Countries.	1912-13			1913-14		
	Imports from.	Exports and reexports to.	Total.	Imports from.	Exports and reexports to.	Total.
British Empire.....	\$364,286,000	\$328,446,000	\$692,732,000	\$415,488,000	\$306,327,000	\$721,815,000
United Kingdom.....	329,112,000	200,626,000	529,738,000	381,477,000	189,314,000	570,791,000
British possessions.....	35,174,000	127,820,000	162,994,000	34,011,000	117,013,000	151,024,000
Foreign countries.....	158,047,000	469,948,000	627,995,000	179,029,000	501,206,000	680,235,000
Russia.....	1,077,000	6,585,000	8,262,000	188,000	8,028,000	8,216,000
Germany.....	33,428,000	80,892,000	114,320,000	41,092,000	85,712,000	126,804,000
Netherlands.....	4,728,000	12,120,000	16,848,000	5,039,000	14,327,000	19,366,000
Belgium.....	9,574,000	42,720,000	52,594,000	13,814,000	39,344,000	53,058,000
France.....	7,069,000	51,213,000	58,282,000	8,732,000	57,489,000	66,221,000
Italy.....	5,100,000	22,527,000	27,027,000	7,123,000	23,607,000	32,730,000
Austria-Hungary.....	11,444,000	23,630,000	35,074,000	13,920,000	32,478,000	46,398,000
Persia.....	2,303,000	3,641,000	5,944,000	2,310,000	4,554,000	6,874,000
Java.....	30,948,000	10,548,000	41,496,000	34,860,000	6,312,000	41,172,000
China (excluding Hongkong and Macao).....	6,695,000	35,757,000	42,452,000	5,533,000	18,539,000	24,072,000
Japan.....	13,194,000	60,778,000	73,972,000	15,508,000	73,630,000	89,138,000
United States.....	16,881,000	61,252,000	78,133,000	15,542,000	70,933,000	86,435,000
All other countries.....	14,706,000	58,285,000	72,991,000	15,308,000	64,383,000	79,751,000
Total.....	522,333,000	798,394,000	1,320,727,000	594,517,000	807,533,000	1,402,050,000

Summary of imports to India.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Animals, live: Horses.....	\$970,628	\$1,157,906	Cutlery.....	\$728,316	\$919,194
Apparel, n.e.s.....	5,226,437	6,552,638	Drugs and medicines.....	3,425,476	3,798,255
Arms, ammunition, etc.....	1,184,453	980,055	Dyeing and tanning materials.....	4,935,546	4,587,323
Bicycles.....	1,150,438	1,126,381	Earthenware and porcelain (excluding pipes).....	1,762,028	2,059,887
Books and printed matter.....	1,374,421	1,601,278	Furniture and cabinetwork.....	725,109	778,840
Boots and shoes.....	2,153,660	2,571,444	Glass and glassware.....	5,088,603	6,311,135
Building and engineering materials.....	2,987,627	3,441,292	Grain, pulse, and flour.....	424,334	907,894
Carriages and carts.....	835,174	823,261	Gums and resins.....	951,396	726,573
Chemicals.....	3,025,639	2,960,083	Haberdashery and millinery.....	4,449,076	5,190,370
Clocks and watches.....	809,289	863,809	Hardware (excluding cutlery, etc.).....	11,089,863	12,809,061
Coal, coke, and patent fuel.....	3,758,356	3,459,692	Instruments, apparatus etc.: Electrical (not telegraph and telephone).....	2,685,135	3,486,711
Cotton, manufactures of: Piece goods—			All other.....	2,125,809	2,421,288
Unbleached.....	81,475,362	82,567,545	Leather.....	1,389,284	1,297,513
Bleached.....	43,883,610	46,344,672			
Colored.....	45,981,865	57,948,739			
All other (including twist and yarn).....	24,386,421	26,480,232			

Summary of imports to India—Continued.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Liquors:			Provisions, etc.:		
Malt.....	\$2,196,816	\$2,138,267	Farinaceous and patent foods.....	\$1,383,634	\$1,549,148
Spirits.....	3,790,463	4,149,519	Canned and bottled, n.e.s.	1,308,778	1,839,260
Wines, etc.	933,886	970,273	All other.....	4,839,238	4,636,826
Machinery and millwork:			Railway plant, etc.	20,773,132	32,555,883
Electrical, and parts of.	1,172,038	1,680,383	Salt.....	2,757,111	2,844,284
Textile.....	6,629,857	10,641,245	Ships, parts of (including launches and boats)....	473,578	732,822
All other.....	9,772,024	12,848,913	Silk:		
Matches.....	3,191,032	2,908,469	Raw.....	5,562,283	4,084,497
Metals and ores, and manufactures of:			Manufactures.....	4,342,996	5,490,599
Copper.....	7,691,927	13,360,543	Soap.....	2,317,120	2,435,197
Iron or steel—			Spices.....	5,291,876	5,620,155
Sheets and plates.....	18,620,679	25,512,947	Stationery (excluding paper).....	2,044,971	2,270,359
All other.....	13,282,834	17,773,602	Sugar.....	46,325,051	48,525,093
Steel.....	5,428,148	8,648,389	Tobacco, and manufactures of.....	2,251,223	2,442,808
All other.....	5,273,237	6,320,065	of.....	614,298	714,801
Motor cars and motor cycles	4,176,328	4,973,767	Toilet requisites, n.c.s.	1,359,783	1,432,946
Oils:			Toys, etc.	1,426,610	1,722,673
Mineral.....	12,176,455	13,352,528	Umbrellas.....	2,175,627	2,821,947
Vegetable, nonessential.....	325,802	367,494	Wood and timber.....	9,922,901	12,407,900
All other.....	443,445	561,263	Wool, and manufactures of.....	41,158,412	39,028,701
Paints and painter's materials.....			All other articles.....	522,333,465	594,517,082
Paper and pasteboard.....	2,479,516	2,671,071	Total.....		
Precious stones and pearls.....	6,491,165	10,150,966			
Printing and lithographing machinery and materials.....	3,511,564	3,478,053			
	515,387	590,165			

Summary of exports of Indian merchandise.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Animals, live.....	\$1,081,336	\$1,192,716	Metals and ores:		
Candles.....	564,339	768,372	Iron, pig.....	\$1,527,069	\$1,374,387
Chemicals and drugs.....	1,835,606	1,738,032	Manganese ore.....	3,711,670	3,935,845
Coal, coke, etc.	2,867,663	2,245,520	All other, and manufactures of.....		
Coffee.....	5,078,207	4,985,252	Mica.....	1,057,194	1,800,428
Cofr, and manufactures of.	2,710,728	2,940,291	Oils (mainly vegetable).....	1,661,175	1,472,428
Cotton:			Oilcakes.....	2,783,370	3,197,704
Raw.....	91,202,181	133,155,494	Opium.....	3,997,280	4,478,392
Twist and yarn.....	32,173,551	31,899,289	Paraffin wax.....	36,406,715	11,095,771
Manufactures—			Provisions, etc.	1,947,564	2,183,774
Piece goods.....	6,808,574	6,932,733	Rubber, and manufactures of.....	1,557,616	1,766,243
All other.....	600,122	489,161	Seeds:		
Dyeing and tanning substances:			Castor.....	5,315,079	6,504,802
Indigo.....	714,183	690,741	Copra.....	4,179,667	5,060,313
Myrobalans.....	2,016,094	1,847,450	Cotton.....	3,331,171	6,894,580
All other.....	855,589	836,853	Groundnut.....	13,112,882	15,836,788
Fish.....	1,219,959	1,272,999	Linseed.....	25,881,911	21,694,847
Fodder, bran, etc.	3,682,305	2,511,450	Rape.....	11,696,604	13,877,852
Fruits and vegetables.....	1,550,593	2,008,706	Sesame.....	5,916,604	8,741,884
Grain, pulse, and flour:			All other.....	4,241,291	4,686,172
Rice and rice flour.....	105,620,237	86,418,436	Silk, and manufactures of.....	1,593,472	987,004
Wheat.....	57,404,339	42,608,986	Spices.....	3,026,355	2,965,665
All other.....	32,605,122	17,517,059	Tea.....	43,130,091	48,584,080
Hemp, and manufactures of.	3,132,654	3,327,041	Tobacco, and manufactures of.....	1,244,666	1,555,168
Hides and skins:			Wood and timber:		
Raw.....	38,180,048	38,033,041	Teak.....	3,090,013	2,551,589
Tanned or dressed.....	14,932,043	13,709,738	Sandalwood.....	494,001	625,958
Jute:			All other.....	355,727	297,582
Raw.....	87,761,400	100,011,096	Wool, and manufactures of.	9,385,571	8,939,736
Manufactures.....	74,201,492	91,727,486	All other articles.....	10,703,293	10,320,742
Lac (except lac dye).....	6,856,319	6,377,719	Total.....	783,016,390	792,359,272
Manures.....	3,143,968	3,065,360			

106 RESOURCES, INDUSTRIES, AND TRADE OF BRITISH INDIA.

Imports and exports by countries, including reexports and excluding Government stores.

UNITED KINGDOM.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
IMPORTS FROM—continued.					
Apparel.....	\$2,229,000	\$2,340,000	Wool, manufactures of (including yarn).....	\$5,742,000	\$7,214,000
Arms, ammunition, etc.....	1,084,000	1,031,000	All other articles.....	18,417,000	21,177,000
Books and printed matter.....	1,307,000	1,533,000	Total.....	329,112,000	381,477,000
Building materials.....	2,207,000	2,530,000	EXPORTS TO.		
Carriages and carts.....	655,000	566,000	Barley.....	8,455,000	3,979,000
Chemicals.....	2,273,000	2,459,000	Bran and pollard.....	1,791,000	1,235,000
Coal and coke.....	1,148,000	1,160,000	Bristles and fibers.....	548,000	414,000
Cotton:			Coffee.....	1,679,000	1,795,000
Raw.....	3,261,000	653,000	Coir, and manufactures of.....	744,000	936,000
Twist and yarn.....	12,702,000	11,574,000	Cotton:		
Piece goods—			Raw.....	3,489,000	4,659,000
Unbleached.....	79,777,000	81,193,000	Twist and yarn.....	89,000	43,000
Bleached.....	42,660,000	45,194,000	Manufactures of.....	368,000	262,000
Colored, etc.....	40,071,000	49,753,000	Drugs, medicines, etc.....	195,000	180,000
Other manufactures.....	5,161,000	6,139,000	Dyeing materials:		
Drugs and medicines.....	1,819,000	1,951,000	Cutch and gambier.....	214,000	169,000
Earthenware.....	1,054,000	1,193,000	Indigo.....	74,000	209,000
Flax, manufactures of.....	1,039,000	1,285,000	Myrobalans.....	888,000	694,000
Glass and glassware.....	758,000	850,000	Gram (chick-peas).....	915,000	336,000
Haberdashery and millinery.....	1,927,000	2,149,000	Hemp, raw (chiefly sann).....	1,660,000	1,434,000
Hardware and cutlery.....	6,692,000	7,702,000	Hides and skins:		
Instruments, apparatus, etc.....	3,655,000	4,432,000	Raw.....	2,494,000	1,533,000
Ivory.....	330,000	374,000	Dressed or tanned.....	12,956,000	11,848,000
Jewelry, etc.....	397,000	410,000	Horn and hornmeal.....	221,000	164,000
Leather (including tanned hides).....	1,129,000	1,082,000	Jute:		
Liquors:			Raw.....	35,779,000	37,762,000
Malt.....	1,661,000	1,604,000	Gunny bags.....	2,700,000	2,927,000
Spirits.....	2,271,000	2,505,000	Gunny cloth.....	1,976,000	2,714,000
Wines.....	395,000	441,000	Lac.....	1,591,000	1,949,000
Machinery and millwork.....	15,035,000	22,573,000	Manures.....	308,000	378,000
Metals:			Metals and ores.....	1,875,000	1,716,000
Copper.....	3,958,000	6,590,000	Mica.....	985,000	890,000
Iron.....	945,000	1,178,000	Oils.....	775,000	757,000
Iron or steel.....	22,652,000	33,142,000	Provisions.....	192,000	190,000
Lead.....	451,000	586,000	Pulse.....	1,965,000	1,387,000
Steel.....	1,566,000	1,956,000	Rice, husked.....	6,352,000	5,498,000
All other	1,797,000	1,988,000	Rubber, raw.....	1,185,000	1,636,000
Oils:			Salt-peter.....	190,000	189,000
Mineral.....	709,000	752,000	Seeds:		
Vegetable, animal, etc.....	565,000	601,000	Castor.....	2,442,000	2,045,000
Paints and colors.....	1,585,000	1,659,000	Cotton.....	3,200,000	6,804,000
Paper, pasteboard, etc.....	2,725,000	2,896,000	Linseed.....	7,931,000	8,021,000
Provisions.....	4,915,000	4,899,000	Rape.....	1,112,000	875,000
Railway plant and rolling stock.....	18,972,000	30,266,000	Silk, raw.....	124,000	125,000
Salt.....	711,000	663,000	Spices.....	334,000	382,000
Ships, parts of.....	448,000	690,000	Sugar.....	535,000	250,000
Silk, manufactures of (including yarn).....	815,000	904,000	Tea.....	30,782,000	35,797,000
Soap.....	2,143,000	2,224,000	Wheat.....	40,783,000	27,713,000
Stationery.....	1,463,000	1,613,000	Wood (mainly teak).....	2,102,000	1,600,000
Sugar.....	940,000	904,000	Wool:		
Tea chests.....	1,353,000	1,610,000	Raw.....	8,296,000	7,589,000
Tobacco.....	1,859,000	2,039,000	Manufactures of.....	584,000	593,000
Toys and sporting goods.....	588,000	547,000	All other articles.....	5,735,000	5,802,000
Umbrellas.....	497,000	613,000	Reexports.....	3,856,000	3,234,000
			Total.....	200,626,000	189,314,000

Imports and exports by countries, including reexports and excluding Government stores—Continued.

GERMANY.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
IMPORTS FROM.					
Apparel (including boots and shoes).....	\$519,000	\$540,000	Barley.....	\$4,769,000	\$33,000
Chemicals.....	414,000	409,000	Coir, and manufactures of.....	727,000	776,000
Cotton, manufactures of (including yarn).....	3,281,000	4,596,000	Cotton, raw.....	10,748,000	19,474,000
Dyes.....	3,311,000	3,027,000	Fodder, bran, etc.....	952,000	516,000
Glass and glassware.....	837,000	928,000	Fruits and vegetables.....	101,000	192,000
Haberdashery and millinery.....	709,000	905,000	Hemp, raw.....	332,000	338,000
Instruments, apparatus, millwork, etc.....	519,000	497,000	Indigo.....	22,000	3,000
Hardware and cutlery.....	2,365,000	2,747,000	Hides and skins, raw.....	9,070,000	10,324,000
Liquors.....	747,000	771,000	Jute:		
Machinery, etc.....	962,000	1,401,000	Raw.....	18,592,000	21,895,000
Matches.....	109,000	81,000	Gunny bags.....	574,000	556,000
Metals.....	8,729,000	12,524,000	Gunny cloth.....	129,000	424,000
Oils.....	905,000	1,049,000	Lac.....	1,088,000	890,000
Paper and pasteboard.....	800,000	899,000	Manures.....	341,000	311,000
Salt.....	311,000	302,000	Oils.....	225,000	337,000
Silk, manufactures of (including yarn, etc.).....	568,000	727,000	Rice, husked.....	15,248,000	10,201,000
Sugar.....	247,000	59,000	Seeds:		
Toys and sporting goods.....	363,000	376,000	Rape.....	2,919,000	3,167,000
Wool, manufactures of (including yarn, etc.).....	3,080,000	3,486,000	Copra.....	3,344,000	3,200,000
All other articles.....	4,652,000	5,777,000	Linseed.....	2,451,000	2,613,000
Total.....	33,428,000	41,092,000	Mowra.....	487,000	1,505,000
			Poppy.....	192,000	200,000
			Sesame.....	642,000	1,318,000
			All other.....	609,000	1,269,000
			Tea:		
			Wood (chiefly teak).....	95,000	120,000
			All other articles.....	667,000	691,000
			Reexports.....	6,278,000	5,091,000
				227,000	205,000
			Total.....	80,892,000	85,712,000

JAPAN.

IMPORTS FROM.			EXPORTS TO.		
Apparel.....	\$353,000	\$333,000	Cotton, raw.....	\$17,032,000	\$62,944,000
Camphor.....	461,000	405,000	Hides and skins, tanned or dressed.....	501,000	430,000
Cotton hosiery.....	2,020,000	2,705,000	Jute manufactures.....	221,000	482,000
Glass and glassware.....	734,000	513,000	Manures.....	244,000	309,000
Matches.....	1,272,000	1,268,000	Rice, husked.....	8,816,000	5,241,000
Metals.....	300,000	1,344,000	All other articles.....	3,887,000	4,156,000
Silk, manufactures of (including yarn, etc.).....	5,011,000	4,699,000	Reexports.....	79,000	68,000
All other articles.....	3,040,000	4,241,000	Total.....	60,778,000	73,630,000
Total.....	13,194,000	15,508,000			

UNITED STATES.

IMPORTS FROM.			EXPORTS TO—continued.		
Cotton piece goods.....	\$1,294,000	\$812,000	Jute—Continued.		
Hardware and cutlery.....	965,000	1,299,000	Gunny bags.....	\$2,885,000	\$4,907,000
Iron or steel.....	2,104,000	1,313,000	Gunny cloth.....	25,537,000	33,170,000
Machinery and millwork.....	682,000	818,000	Lac.....	3,066,000	2,860,000
Oils, mineral.....	5,723,000	7,495,000	Manganese ore.....	801,000	519,000
Tobacco.....	60,000	77,000	Mica.....	272,000	327,000
All other articles.....		3,698,000	Myrobalans.....	267,000	277,000
Total.....	16,881,000	15,542,000	Oils, vegetable.....	212,000	307,000
EXPORTS TO.			Saltpetre.....	220,000	108,000
Hides and skins:			Seeds:		
Raw.....	13,372,000	11,514,000	Castor.....	941,000	994,000
Dressed or tanned.....	999,000	1,010,000	Linseed.....	634,000	-----
Indigo.....	64,000	38,000	Spices.....	248,000	314,000
Jute:			Tea.....	349,000	335,000
Raw.....	9,200,000	11,957,000	All other articles.....	1,395,000	2,010,000
			Reexports.....	291,000	246,000
			Total.....	61,252,000	70,893,000

Imports and exports by countries, including reexports and excluding Government stores—Continued.

FRANCE.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
IMPORTS FROM.					
Apparel.....	\$1,343,000	\$1,456,000	Jute, raw.....	\$8,975,000	\$9,952,000
Clocks and watches.....	178,000	83,000	Lac.....	487,000	245,000
Cotton, manufactures of (including yarn).....	91,000	122,000	Manganese ore.....	624,000	621,000
Dyes.....	199,000	208,000	Manures.....	402,000	386,000
Liquors.....	1,310,000	1,360,000	Rice, husked.....	565,000	745,000
Provisions.....	93,000	99,000	Seeds:		
Silk, manufactures of (including yarn, etc).....	900,000	798,000	Castor.....	784,000	1,005,000
Wool, manufactures of (including yarn, etc).....	463,000	806,000	Groundnut.....	10,829,000	12,753,000
All other articles.....	2,492,000	3,800,000	Linseed.....	4,965,000	6,184,000
Total.....	7,069,000	8,732,000	Mowra.....	7,000	23,000
EXPORTS TO.					
Coffee.....	2,003,000	1,863,000	Poppy.....	1,358,000	847,000
Cotton, raw.....	4,006,000	6,566,000	Rape.....	2,911,000	2,979,000
Hides and skins, raw.....	1,360,000	940,000	Sesame.....	1,663,000	1,675,000
Horn and horn meal.....	307,000	191,000	All other.....	451,000	723,000
			Silk, raw.....	1,216,000	509,000
			Wheat.....	4,924,000	5,693,000
			All other articles.....	3,474,000	3,399,000
			Reexports.....	181,000	120,000
			Total.....	51,213,000	57,489,000

BELGIUM.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
IMPORTS FROM.					
Cotton, manufactures of (including yarn).....	\$1,707,000	\$2,443,000	Hemp, raw.....	\$597,000	\$628,000
Dyes, aniline, etc.....	369,000	439,000	Hides and skins.....	558,000	718,000
Earthenware and porcelain.....	118,000	119,000	Jute:		
Glass and glassware.....	619,000	628,000	Manufactures of Raw.....	395,000	500,000
Hardware and cutlery.....	231,000	264,000	Manganese ore.....	494,000	512,000
Machinery and millwork.....	46,000	73,000	Mannures.....	897,000	1,033,000
Matches.....	78,000	68,000	Rice, husked.....	775,000	810,000
Metals:			Seeds:		
Copper.....	36,000	296,000	Castor.....	2,382,000	632,000
Iron.....	472,000	498,000	Copra.....	516,000	747,000
Iron or steel.....	1,744,000	2,090,000	Groundnut.....	78,000	672,000
Steel.....	2,182,000	3,417,000	Linseed.....	934,000	970,000
Paper and pasteboard.....	186,000	176,000	Mowra.....	6,329,000	2,062,000
Railway plant, etc.....	124,000	242,000	Poppy.....	169,000	236,000
All other articles.....	1,962,000	3,061,000	Rape.....	232,000	388,000
Total.....	9,874,000	13,814,000	Sesame.....	4,430,000	5,503,000
EXPORTS TO.					
Barley.....	3,837,000	707,000	All other.....	1,361,000	2,713,000
Cotton, raw.....	10,182,000	13,728,000	Wheat.....	59,000	81,000
Dyeing and tanning materials.....	235,000	230,000	All other articles.....	6,232,000	4,916,000
			Reexports.....	1,934,000	1,296,000
			Total.....	99,000	101,000
				42,720,000	39,244,000

AUSTRIA-HUNGARY.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
IMPORTS FROM.					
Apparel (including boots and shoes).....	\$371,000	\$368,000	Coffee.....	\$170,000	\$237,000
Cotton:			Cotton:		
Manufactures of.....	777,000	896,000	Raw.....	4,911,000	9,487,000
Twist and yarn.....	116,000	200,000	Twist and yarn.....	13,000	4,000
Glass and glassware.....	2,241,000	2,835,000	Hides and skins.....	3,880,000	6,048,000
Faberdashery and millinery.....	757,000	725,000	Indigo.....	142,000	105,000
Hardware and cutlery.....	1,075,000	1,092,000	Jute, raw.....	5,354,000	6,421,000
Matches.....	266,000	314,000	Lac.....	166,000	131,000
Metals.....	363,000	558,000	Seeds.....	2,501,000	2,824,000
Paper and pasteboard.....	372,000	429,000	Rice, husked.....	5,991,000	6,667,000
Sugar.....	3,462,000	4,489,000	All other articles.....	400,000	435,000
Wool, manufactures of (including yarn).....	271,000	375,000	Reexports.....	102,000	117,000
All other articles.....	1,371,000	1,639,000	Total.....	23,630,000	32,478,000
Total.....	11,444,000	13,920,000			

Imports and exports by countries, including reexports and excluding Government stores—Continued.

ITALY.

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
IMPORTS FROM.					
Apparel.....	\$207,000	\$377,000	Jute, raw.....	\$4,483,000	\$5,540,000
Cotton:			Pepper.....	214,000	296,000
Manufactures of.....	1,610,000	2,934,000	Castor.....	318,000	555,000
Twist and yarn.....	257,000	283,000	Linseed.....	1,889,000	1,580,000
Dyes, aniline, etc.....	93,000	56,000	Sesame.....	398,000	1,084,000
Silk, manufactures of (including yarn, etc.).....	578,000	622,000	All other.....	254,000	952,000
All other articles.....	2,355,000	2,851,000	Wheat.....	3,589,000	1,401,000
Total.....	5,100,000	7,123,000	All other articles.....	829,000	944,000
EXPORTS TO.					
Cotton, raw.....	7,127,000	10,323,000	Reexports.....	137,000	187,000
Hides and skins, raw.....	3,290,000	2,746,000	Total.....	22,527,000	25,607,000

CHINA (EXCLUDING HONGKONG AND MACAO).

Articles.	1912-13	1913-14	Exports To—continued.	1912-13	1913-14
IMPORTS FROM.					
Silk:			Grain, pulse, and flour.....	\$446,000	\$145,000
Raw.....	\$4,271,000	\$3,084,000	Jute, manufactures of (including twist and yarn).....	2,387,000	1,647,000
Manufactures of (including yarn, etc.).....	1,226,000	1,251,000	Opium.....	15,781,000	135,000
Tea.....	226,000	356,000	Tea.....	1,327,000	1,646,000
All other articles.....	972,000	842,000	All other articles.....	331,000	502,000
Total.....	6,695,000	5,533,000	Reexports.....	52,000	40,000
EXPORTS TO.					
Cotton:			Total.....	35,757,000	18,539,000
Raw.....	1,535,000	1,100,000			
Twist and yarn.....	13,841,000	13,294,000			
Piece goods.....	56,000	30,000			

NETHERLANDS.

Articles.	1912-13	1913-14	Exports To—continued.	1912-13	1913-14
IMPORTS FROM.					
Cotton:			Lac.....	\$177,000	\$66,000
Manufactures of.....	\$3,002,000	\$3,017,000	Rice, husked.....	7,039,000	9,861,000
Twist and yarn.....	530,000	423,000	Seeds:		
All other articles.....	1,196,000	1,599,000	Linseed.....	895,000	514,000
Total.....	4,728,000	5,039,000	Rape.....	82,000	191,000
EXPORTS TO.¹			Wheat.....	111,000	31,000
Cotton, raw.....	257,000	353,000	All other articles.....	2,057,000	1,581,000
Hides and skins, raw.....	1,501,000	1,730,000	Total.....	12,120,000	14,327,000

¹ Includes reexports.

Imports in detail.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Animals, living:			Bicycles, and parts of—Con.		
Other than horses.....	\$148,978	\$154,818	Parts—Continued.		
United Kingdom.....	22,410	29,160	Germany.....	\$70,146	\$36,650
Germany.....	2,321	905	Belgium.....	603	467
Belgium.....	715	647	Austria-Hungary.....	579	127
Austria-Hungary.....	745	1,329	United States.....	516	569
United States.....	15	652	Books and printed matter.....	1,374,421	1,601,278
Apparel (except hoseery and boots and shoes):			United Kingdom.....	1,307,390	1,533,303
Apparel, wearing.....	2,404,523	2,699,764	Germany.....	8,004	10,473
United Kingdom.....	1,400,642	1,595,803	Belgium.....	414	1,372
Germany.....	188,173	272,271	France.....	1,552	764
Belgium.....	2,219	4,278	Austria-Hungary.....	779	1,840
France.....	21,855	21,773	United States.....	33,900	29,335
Austria-Hungary.....	183,613	179,764	Boots and shoes:		
United States.....	9,801	14,912	Leather.....	1,912,496	2,227,504
Gold and silver thread.....	1,475,839	1,473,445	United Kingdom.....	1,856,730	2,166,045
United Kingdom.....	24,030	14,916	Germany.....	2,063	292
Germany.....	173,838	123,989	Austria-Hungary.....	22,079	19,962
Belgium.....	1,518	3,066	United States.....	15,879	22,104
France.....	1,191,796	1,279,388	All other.....	241,159	343,935
Austria-Hungary.....	28,274	26,313	United Kingdom.....	129,048	174,922
Hats, caps, bonnets, etc.....	514,963	686,765	Germany.....	12,492	33,988
United Kingdom.....	272,242	308,152	France.....	1,820	-----
Germany.....	9,529	17,864	Austria-Hungary.....	55,103	81,524
France.....	968	2,550	United States.....	1,207	200
Austria-Hungary.....	58,028	45,127	Brushes and brooms.....	191,361	206,802
United States.....	68	487	United Kingdom.....	92,897	112,037
Lametta.....	292,000	268,976	Germany.....	29,632	31,131
United Kingdom.....	6,292	5,538	Belgium.....	560	720
Germany.....	130,223	90,415	France.....	1,625	2,389
Belgium.....	4,716	8,731	Austria-Hungary.....	44,207	33,341
France.....	126,617	148,715	United States.....	4,497	4,453
Austria-Hungary.....	23,929	15,393	Building and engineering materials (except iron, steel, or wood):		
Arms, ammunition, and military stores:			Asphalt.....	69,732	154,107
Cartridge cases.....	125,089	143,786	United Kingdom.....	67,114	144,817
United Kingdom.....	111,579	123,264	Germany.....	5,893	-----
Germany.....	1,484	3,183	United States.....	1,844	2,389
Belgium.....	1,674	3,484	Bricks.....	159,855	445,601
Austria-Hungary.....	667	107	United Kingdom.....	122,098	227,762
United States.....	8,828	11,894	Germany.....	26,459	128,446
Firearms, and parts of:			Austria-Hungary.....	1,552	-----
United Kingdom.....	321,646	334,265	Cement.....	2,226,317	2,136,350
Germany.....	263,838	267,297	United Kingdom.....	1,776,376	1,799,680
Belgium.....	2,458	2,628	Germany.....	218,817	228,798
France.....	623	2,672	Belgium.....	129,755	38,071
Austria-Hungary.....	4,370	6,842	France.....	2,453	-----
United States.....	5,329	4,730	Austria-Hungary.....	32,907	19,500
All other.....	18,960	19,344	United States.....	44	3,372
United Kingdom.....	83,786	68,666	Tiles.....	257,501	355,644
Germany.....	74,355	61,839	United Kingdom.....	102,897	143,519
Belgium.....	3,071	720	Germany.....	16,421	32,703
France.....	827	165	Belgium.....	26,111	30,479
Austria-Hungary.....	2,462	4,750	France.....	43,730	60,023
United States.....	307	151	Austria-Hungary.....	881	200
Art, works of (except pictures).....	1,465	155	United States.....	749	2,073
United Kingdom.....	154,448	116,947	All other.....	207,707	253,876
Germany.....	114,475	74,380	United Kingdom.....	73,007	122,427
Belgium.....	4,292	15,008	Germany.....	23,865	45,434
France.....	277	934	Belgium.....	69,547	22,016
Austria-Hungary.....	2,730	5,660	France.....	964	934
United States.....	19,310	13,597	Austria-Hungary.....	686	1,917
United States.....	350	511	United States.....	30,104	54,266
Belting, machinery:			Candles.....	260,845	239,918
Leather.....	671,991	815,270	United Kingdom.....	194,805	186,032
United Kingdom.....	633,511	757,583	Germany.....	5,747	11,884
Germany.....	10,015	17,646	Belgium.....	51,969	36,479
United States.....	26,269	33,968	France.....	681	136
All other.....	521,499	556,776	Carriages, and parts of:		
United Kingdom.....	472,532	489,258	Carriages and carts.....	212,759	379,130
Germany.....	42,598	57,045	United Kingdom.....	154,044	262,655
Belgium.....	1,445	492	Germany.....	21,544	81,747
United States.....	2,983	8,492	Belgium.....	949	2,083
Bicycles, and parts of:			Austria-Hungary.....	569	1,372
Bicycles.....	523,548	620,172	United States.....	20,430	21,194
United Kingdom.....	517,445	613,155	Parts.....	622,416	444,131
Germany.....	2,638	3,611	United Kingdom.....	500,529	303,572
Austria-Hungary.....	968	127	Germany.....	92,181	86,001
United States.....	618	535	Belgium.....	12,458	8,003
Parts.....	626,888	506,208	France.....	3,679	1,776
United Kingdom.....	554,762	468,402	United States.....	10,683	8,769

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Chemicals and chemical preparations (except manures and medicines):					
Acids (except nitric and sulphuric).	\$102,197	\$110,547	Coal	\$1,168,155	\$1,150,290
United Kingdom	59,084	66,569	United Kingdom	1,030,131	1,046,551
Germany	21,583	25,296	Germany	27,477	4,477
Belgium	4,190	5,173	Netherlands	288,005	300,302
France	993	745	Belgium	15,237	.....
Austria-Hungary	7,355	4,888	Coffee (except roasted or ground)	51,556	85,952
Aluminous sulphates	151,572	137,016	United Kingdom	5,845	9,630
United Kingdom	131,775	117,502	Germany	4,828	10,098
Germany	14,789	13,320	Austria-Hungary	12,376	13,023
Belgium	5,003	6,176	Cordage and rope of fiber (except jute and cotton)	342,572	434,394
Ammonium, and salts thereof.	123,624	143,026	United Kingdom	159,431	189,511
United Kingdom	117,906	138,345	Germany	2,146	2,180
Germany	2,506	1,698	Belgium	628	774
Belgium	1,751	853	Austria-Hungary	52,300	54,651
United States	555	292	United States	4,044	151
Bleaching materials.	114,946	158,580	Cork, manufactures of	55,963	69,883
United Kingdom	103,403	123,740	United Kingdom	29,218	32,216
Germany	6,365	9,991	Germany	13,660	13,631
Belgium	5,178	24,813	Belgium	720	433
Calcium carbide.	49,303	70,439	France	7,455	9,256
United Kingdom	2,253	5,781	Spain	6,575	9,465
Norway	13,981	16,201	Austria-Hungary	238	1,139
Germany	28,819	41,273	Cotton, raw	7,214,937	884,822
Belgium	380	2,803	United Kingdom	3,202,404	652,763
Disinfectants.	125,473	128,446	Germany	303,022	58
United Kingdom	119,142	119,711	Belgium	135,576	.....
Germany	5,596	5,085	Austria-Hungary	13,938	24
Belgium	399	1,713	Turkey (Levant and Black Sea)	83,193	.....
France	34	131	Persia	37,000	45,185
Potassium compound.	195,110	189,394	United States	3,147,496	6,639
United Kingdom	158,414	141,518	Cotton twist and yarn:		
Germany	23,812	27,578	Mule and water, above No. 50.	1,516,066	1,349,841
France	2,693	6,288	United Kingdom	1,511,549	1,284,741
Italy	10,453	11,704	Germany	735	1,538
Sodium compounds.	891,570	1,073,667	United States		389
United Kingdom	851,511	1,005,397	Orange, red, and other colors—		
Germany	30,377	30,070	Nos. 1 to 20.	299,640	163,018
Belgium	2,925	8,409	United Kingdom	17,501	124,159
United States	1,353	2,477	Germany	18,459	1,246
Sulphur.	174,230	194,144	Belgium	10,726	676
United Kingdom	13,670	12,205	France	39	.....
Germany	88	701	Austria-Hungary	52,972	20,775
Italy	128,768	147,460	Nos. 21 to 25.	367,713	187,905
United States	1,455	.....	United Kingdom	318,065	174,303
All other.	925,739	865,371	Germany	4,438	1,056
United Kingdom	548,688	510,310	Belgium	4,910	15
Germany	278,500	252,970	Austria-Hungary	25,539	2,073
Belgium	46,188	42,494	Nos. 26 to 30.	217,737	208,135
France	8,331	11,514	United Kingdom	182,002	167,841
Austria-Hungary	6,764	8,730	Germany	6,127	4,487
United States	4,609	5,640	Austria-Hungary	6,322	7,889
Chinese and Japanese ware (except earthenware and porcelain).	37,467	41,536	Nos. 31 to 40.	4,723,736	4,253,097
United Kingdom	4,580	258	United Kingdom	5,527,682	3,046,833
Germany	647	73	Germany	65,761	72,224
Japan	21,928	33,910	Netherlands	489,838	396,936
United States	1,202	.....	Belgium	86,765	43,708
Clocks and watches:			Switzerland	249,768	286,578
Clocks.	297,951	339,302	Italy	247,900	257,744
United Kingdom	40,441	38,737	Austria-Hungary	22,692	145,800
Austria-Hungary	22,366	8,492	Above No. 50.	635,317	456,575
Germany	28,114	56,729	United Kingdom	597,110	404,061
France	24,702	2,034	Germany	14,059	7,616
Japan	38,435	70,321	Belgium	5,003	2,759
United States	131,488	156,448	Austria-Hungary	2,252,090	2,836,654
Watches.	484,046	498,266	Unspecified description	2,012,424	2,353,040
United Kingdom	42,275	60,364	United Kingdom	9,470	5,708
Germany	10,886	5,481	Germany	97	.....
France	151,304	80,404	Belgium	46,680	46,042
Switzerland	257,813	316,610	Austria-Hungary	6,760	4,628
Austria-Hungary	1,386	2,205	Japan	167,670	406,333
United States	2,039	1,859	Cotton blankets.	2,646,471	3,640,877
			United Kingdom	47,500	52,336
			Germany	1,404,209	2,052,967

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Cotton blankets—Contd.			Cotton piece goods—Contd.		
Netherlands.....	\$556,951	\$579,503	White (bleached)—Contd.		
Belgium.....	521,441	884,885	Nainsooks—Continued.		
France.....	7,962	15,432	France.....	\$282	\$603
Austria-Hungary.....	15,101	23,019	Switzerland.....	298,779	248,737
Cotton canvas.....	74,681	66,452	Austria-Hungary.....	20,337	10,083
United Kingdom.....	65,167	59,089	Twillis.....	385,548	575,444
Germany.....	2,482	2,988	United Kingdom.....	385,047	572,495
Belgium.....	214	.....	France.....	107	1,329
Austria-Hungary.....	5,689	3,484	Unspecified descriptions.....	1,649,140	1,836,414
United States.....	234	594	United Kingdom.....	1,566,049	1,883,900
Cotton handkerchiefs and shawls in the piece.	1,812,153	2,884,871	Germany.....	7,271	4,010
United Kingdom.....	1,381,166	2,143,002	Netherlands.....	20,945	12,974
Germany.....	213,007	335,949	Belgium.....	1,567	866
Belgium.....	44,679	85,115	France.....	628	204
Italy.....	31,668	79,076	Switzerland.....	15,364	16,415
Austria-Hungary.....	68,593	104,508	Austria-Hungary.....	574	375
Cotton hosiery.	2,077,349	3,885,384	Colored, printed, or dyed—		
United Kingdom.....	196,475	230,254	Cambrics (including muslins, mulls, etc.)	4,704,407	5,384,529
Germany.....	592,107	733,683	United Kingdom.....	4,599,504	5,309,390
Netherlands.....	34,387	20,979	Germany.....	2,248	1,431
Belgium.....	5,178	954	Belgium.....	389	1,421
France.....	311	8,249	France.....	29,204	9,139
Italy.....	33,769	58,880	Switzerland.....	49,609	49,405
Austria-Hungary.....	74,034	106,747	Austria-Hungary.....	20,960	11,438
Japan.....	2,019,184	2,705,117	Chadars.....	14,118	21,782
United States.....	2,711	5,173	United States.....	8,200	19,821
Cotton: Lace and patent net.	217,455	204,685	Germany.....	496	827
United Kingdom.....	154,331	150,093	Austria-Hungary.....	.....	404
Germany.....	39,608	31,944	Checks, spots, and stripes.....	786,339	1,410,049
Belgium.....	1,153	102	United Kingdom.....	734,477	1,238,909
Netherlands.....	20,040	16,658	Germany.....	8,010	5,742
Austria-Hungary.....	2,156	5,168	Belgium.....	11,670	24,342
Cotton piece goods:			France.....	146	63
Gray (unbleached)—			Austria-Hungary.....	2,633	1,275
Dhutis, saris, and scarfs	39,418,674	43,686,376	Dhutis (including lungis).....	3,477,820	3,772,671
United Kingdom.....	39,413,307	43,686,288	United Kingdom.....	1,844,131	2,148,545
Drills and jeans.	2,098,245	1,472,905	Germany.....	16,322	17,490
United Kingdom.....	738,978	507,547	Netherlands.....	1,380,777	1,378,076
Germany.....	25,379	.....	Belgium.....	4,628	3,265
Austria-Hungary.....	1,436	7,709	France.....	297	11,149
Japan.....	54,334	136,763	Switzerland.....	61,522	107,136
United States.....	1,277,597	816,088	Austria-Hungary.....	2,164	4,852
Jacquets, including madapolams, mulls, and cambrics.	6,849,930	7,875,399	Drills and jeans.....	1,818,000	2,271,132
United Kingdom.....	6,848,981	7,874,051	United Kingdom.....	1,510,051	2,027,291
Longcloth and shirtings.	32,103,692	28,882,021	Germany.....	4,429	4,582
United Kingdom.....	31,925,715	28,554,471	Netherlands.....	52,763	45,794
Austria-Hungary.....	.....	2,813	Belgium.....	.....	1,499
Japan.....	165,412	315,437	France.....	467	127
Sheetings.	144,441	11,850	Italy.....	241,685	177,827
United Kingdom.....	34,328	6,083	Austria-Hungary.....	2,185	2,049
Japan.....	56,836	1,299	United States.....	4,988	331
United States.....	151	.....	Prints and chintz.	10,285,017	11,967,643
White (bleached)—			United Kingdom.....	10,189,088	11,790,186
Checks, spots, and stripes.	804,715	1,110,097	Germany.....	3,701	2,302
United Kingdom.....	789,882	1,056,201	Netherlands.....	23,160	37,396
Germany.....	.....	10	Belgium.....	136	720
Switzerland.....	14,429	52,952	France.....	.....	842
Austria-Hungary.....	.....	414	Switzerland.....	18,697	26,406
Drills and jeans.	675,436	583,513	Italy.....	15,329	88,098
United Kingdom.....	665,504	580,510	Austria-Hungary.....	10,317	9,864
Germany.....	10	.....	Saris and scarfs.	5,757,357	5,974,364
United States.....	1,703	.....	United Kingdom.....	5,586,761	5,812,552
Jacquets, cambrics, muslins, etc.	13,587,878	18,515,587	Germany.....	18,658	24,775
United Kingdom.....	13,429,253	18,328,305	Austria-Hungary.....	135,041	119,959
Germany.....	433	141	Shirtings.....	5,768,068	8,461,997
Netherlands.....	65,965	106,975	United Kingdom.....	5,752,174	8,403,380
Belgium.....	311	599	Germany.....	1,518	1,840
France.....	905	852	Belgium.....	112	2,487
Switzerland.....	45,799	52,811	France.....	.....	1,367
Austria-Hungary.....	1,625	462	Italy.....	1,849	38,698
Longcloth and shirtings.	11,356,610	7,754,670	Austria-Hungary.....	39	954
United Kingdom.....	10,711,468	7,176,788	Twillis.....	1,753,595	2,114,085
Germany.....	1,158	146	United Kingdom.....	1,673,064	1,904,205
Netherlands.....	639,501	565,954	Germany.....	2,750	2,083
Austria-Hungary.....	44	3,966	Belgium.....	667	699
Nainsooks.	10,831,841	9,105,076	Italy.....	64,510	198,422
United Kingdom.....	10,502,394	8,836,182	Austria-Hungary.....	2,292	1,299
		222	Unspecified descriptions.	11,617,056	16,570,486
		222	United Kingdom.....	8,174,294	11,099,221
		222	Germany.....	222	222

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Cotton piece goods—Contd.			Dying and tanning substances—Continued.		
Colored, printed, or dyed—			Coal-tar dyes—Continued.		
Continued.			Aniline.....	\$2,541,170	\$2,490,783
Unspecified description—			United Kingdom.....	40,708	21,617
Continued.			Germany.....	2,066,330	1,987,002
Netherlands.....	\$167,339	\$168,488	Belgium.....	174,712	223,163
Belgium.....	919,048	1,336,020	France.....	827	195
France.....	48,169	68,530	Austria-Hungary.....	5,952	6,935
Switzerland.....	185,954	193,609	Indigo, synthetic.....	261,464	301,723
Italy.....	1,182,886	2,148,297	United Kingdom.....	5	355
Austria-Hungary.....	210,525	328,041	Germany.....	279,220	268,675
United States.....	1,372	419	Belgium.....	10,745	30,582
Tents.	1,598,212	1,755,726	Austria-Hungary.....	1,290	-----
United Kingdom.....	1,567,227	1,702,983	Other coal-tar dyes.....	27,048	33,170
Germany.....	16,118	13,300	United Kingdom.....	584	560
France.....	477	2,389	Germany.....	9,358	13,373
Austria-Hungary.....	3,066	287	Belgium.....	16,702	19,237
United States.....	8,380	25,685	All other (except lac dye).....	523,382	499,906
Cotton rope.....	147,640	187,170	United Kingdom.....	29,389	16,400
United Kingdom.....	146,805	182,990	France.....	146,530	151,645
Germany.....	83	355	Germany.....	110,980	125,507
Austria-Hungary.....	569	127	Belgium.....	14,794	5,747
Cotton thread, sewing—	1,301,443	1,265,178	Spain.....	138,248	158,587
United Kingdom.....	1,110,054	1,104,175	Earthenware and porcelain (except pipes).....	1,762,028	2,050,887
Germany.....	19,232	18,449	United Kingdom.....	1,053,699	1,192,755
Belgium.....	51,473	35,010	Germany.....	188,479	273,463
Austria-Hungary.....	108,868	94,391	Belgium.....	117,662	118,713
Cotton: Other manufactures.	775,511	821,271	France.....	3,520	6,531
United Kingdom.....	479,715	506,685	Austria-Hungary.....	94,352	75,752
Germany.....	108,168	115,584	United States.....	3,855	3,124
Belgium.....	32,542	17,719	Electroplated ware.....	183,919	235,597
France.....	127	1,027	United Kingdom.....	162,280	210,238
Austria-Hungary.....	88,337	51,097	Germany.....	4,200	7,528
United States.....	331	521	France.....	4,140	968
Cutlery.	728,316	919,194	Austria-Hungary.....	1,890	2,146
United Kingdom.....	339,672	378,122	United States.....	6,847	3,982
Germany.....	286,608	400,440	Fireworks.....	296,389	240,965
Belgium.....	48,529	60,641	United Kingdom.....	79,762	14,512
France.....	3,217	9,582	Germany.....	50,534	57,770
Austria-Hungary.....	3,368	5,110	Belgium.....	490	2,448
United States.....	41,122	55,303	Austria-Hungary.....	4,930	5,519
Drugs and medicines (except chemicals and narcotics):			United States.....	10	34
Aloes.....	10,332	11,903	Flax, manufactures of:		
United Kingdom.....	526	-----	Bags and sacks.....	80,808	72,555
Germany.....	6,735	6,876	United Kingdom.....	56,374	53,235
Camphor.....	496,840	422,792	Germany.....	618	209
United Kingdom.....	7,173	2,531	Canvas.....	586,992	749,801
Germany.....	0,256	10,628	United Kingdom.....	586,189	747,932
Japan.....	460,819	404,883	Germany.....	394	433
Proprietary and patent medicines.	746,054	856,606	Austria-Hungary.....	900	900
United Kingdom.....	609,656	611,636	Piece goods.....	281,347	357,610
Germany.....	12,069	75,582	United Kingdom.....	262,314	312,152
Belgium.....	672	1,606	Germany.....	4,472	7,528
France.....	26,410	44,957	Belgium.....	7,981	20,264
Austria-Hungary.....	146	2,516	France.....	501	1,314
United States.....	75,830	77,158	Austria-Hungary.....	63,410	54,515
Quinine, and alkaloids of.	347,999	498,528	Thread, sewing.....	50,777	40,840
United Kingdom.....	250,760	339,103	United Kingdom.....	2,200	2,706
Germany.....	37,492	91,661	Germany.....	526	-----
Belgium.....	7,971	11,928	Austria-Hungary.....	9,908	10,599
United States.....	34,260	28,634	All other.....	88,188	130,092
Sarsaparilla and preparations thereof.	12,663	12,439	United Kingdom.....	76,725	121,195
United Kingdom.....	5,718	7,061	Germany.....	8,984	10,838
Germany.....	5,893	5,027	Belgium.....	1,022	662
United States.....	1,051	200	France.....	170	1,859
All other.....	1,341,150	1,468,408	Austria-Hungary.....	672	939
United Kingdom.....	941,449	987,656	United States.....	97	-----
Germany.....	116,353	149,494	Fruits and vegetables (dried, salted, or preserved, not canned or bottled):		
Belgium.....	10,263	20,021	Almonds.....	910,814	793,011
France.....	49,122	38,470	United Kingdom.....	6,472	2,404
Austria-Hungary.....	3,596	8,375	France.....	315,260	244,989
United States.....	39,054	44,699	Austria-Hungary.....	10,522	11,597
Dyeing and tanning substances:			All other (except currants, raisins, and dates).....		
Coal-tar dyes—			United Kingdom.....	221,523	208,057
Alizarin.....	1,156,621	915,355	France.....	31,890	32,742
United Kingdom.....	150,271	114,660	Germany.....	1,139	618
Germany.....	844,756	631,497	Belgium.....	156	-----
Belgium.....	152,599	160,332	France.....	4,399	5,095

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Fruits and vegetables (dried, salted, or preserved, not canned or bottled)—Con.			Gums and resins:		
All other, except currants, raisins, and dates)—Con.			Bosin.....	\$293,416	\$161,324
Austria-Hungary.....	\$2,015	\$7,957	United Kingdom.....	63,840	50,977
United States.....	3,314	2,360	Germany.....	6,311	6,565
Furniture and cabinet ware:			Belgium.....	5,361	11,704
Bedsteads.....	118,319	123,439	Austria-Hungary.....	160	.....
United Kingdom.....	109,287	113,905	United States.....	222,321	91,820
United States.....	4,093	3,991	Haberdashery and millinery:	4,449,976	5,190,370
Furniture, wooden, n. e. s.	147,508	174,639	United Kingdom.....	1,927,231	2,149,343
United Kingdom.....	71,238	79,626	Germany.....	708,558	904,858
Germany.....	5,850	8,350	Belgium.....	30,080	25,588
Austria-Hungary.....	34,752	50,996	France.....	271,054	277,288
United States.....	18,575	15,602	Switzerland.....	231,237	287,858
Furniture, other materials n. e. s.	283,483	304,084	Italy.....	105,365	243,708
United Kingdom.....	153,124	201,507	Austria-Hungary.....	757,150	724,812
Germany.....	14,702	12,925	Japan.....	347,147	492,509
Belgium.....	3,407	1,586	United States.....	21,666	32,323
France.....	6,190	5,957	Hardware (except cutlery and electroplated ware):		
Austria-Hungary.....	1,119	798	Agricultural implements:	453,309	522,666
United States.....	36,031	29,002	United Kingdom.....	406,742	472,119
Moldines.....	175,797	176,678	Germany.....	2,978	1,465
United Kingdom.....	10,171	12,376	France.....	219	49
Germany.....	158,448	150,934	Austria-Hungary.....	258	282
United States.....	6,157	8,852	United States.....	32,440	30,508
Glass and glassware:			Builders' hardware:	716,689	798,962
Bangles.....	2,000,091	2,610,006	United Kingdom.....	331,722	306,974
United Kingdom.....	161	3,772	Germany.....	220,170	339,964
Germany.....	42,810	87,913	Belgium.....	30,615	26,542
Austria-Hungary.....	1,812,435	2,353,220	France.....	652	623
Beads and false pearls.....	981,412	792,875	United States.....	62,359	68,092
United Kingdom.....	1,348	2,185	Domestic hardware (except enamelled ware):		
Germany.....	74,433	118,334	United Kingdom.....	602,492	606,629
Belgium.....	14,974	10,113	Germany.....	269,760	271,307
France.....	101,403	128,928	Belgium.....	204,898	223,288
Austria-Hungary.....	155,816	182,844	France.....	6,176	11,835
Bottles and phials—			Austria-Hungary.....	9,706	12,911
Soda-water bottles.....	180,460	210,184	United States.....	11,792	14,955
United Kingdom.....	170,466	204,880	Enameled ironware:	948,174	897,031
Germany.....	7,796	4,643	United Kingdom.....	68,160	74,852
All other.....	354,023	501,172	Germany.....	212,131	199,794
United Kingdom.....	94,877	117,150	Belgium.....	4,998	5,042
Germany.....	165,685	229,928	Austria-Hungary.....	659,163	606,473
Belgium.....	6,171	7,718	United States.....	58	141
France.....	4,550	1,995	Implements and tools (except agricultural implements and machine tools)		
Austria-Hungary.....	4,068	3,601	United Kingdom.....	1,125,568	1,321,892
United States.....	3,217	10,079	Germany.....	893,592	1,027,021
Funnels, globes, and parts of lamps.....	529,427	581,756	Belgium.....	78,429	82,672
United Kingdom.....	46,725	44,198	France.....	25,111	28,756
Germany.....	208,640	238,721	Austria-Hungary.....	594	4,949
Belgium.....	72,700	65,388	United States.....	111,258	155,280
Austria-Hungary.....	151,783	164,045	Lamps, metal.....	1,091,253	1,331,289
France.....	404	1,703	United Kingdom.....	219,596	216,739
United States.....	26,181	38,538	Germany.....	219,839	329,097
Sheet and plate.....	667,236	725,216	Belgium.....	6,117	7,747
United Kingdom.....	205,994	234,692	France.....	8,745	5,295
Germany.....	99,612	63,688	Austria-Hungary.....	137,157	163,179
Belgium.....	357,912	395,111	United States.....	375,553	577,889
France.....	501	170	Lamps, glass.....	67,605	53,570
Austria-Hungary.....	2,380	31,058	United Kingdom.....	8,142	8,137
Tableware (including decanters, tumblers, etc.)—			Germany.....	21,417	9,368
United Kingdom.....	206,904	258,230	Belgium.....	579	161
Germany.....	23,009	34,041	Austria-Hungary.....	27,442	19,101
Japan.....	41,740	44,052	United States.....	5,480	2,102
Belgium.....	29,021	62,948	Parts of lamps (except glass):		
Austria-Hungary.....	80,487	81,674	United Kingdom.....	392,089	370,925
United States.....	30,815	31,944	Germany.....	136,437	126,977
All other.....	670	832	Belgium.....	96,658	85,714
United Kingdom.....	760,060	631,686	France.....	4,287	2,365
Germany.....	216,024	209,255	Austria-Hungary.....	998	394
Netherlands.....	196,855	140,165	United States.....	92,055	98,887
Belgium.....	86,993	67,888	Safes, etc.		
France.....	10,811	7,558	United Kingdom.....	114,596	229,887
Austria-Hungary.....	80,638	68,219	Germany.....	53,950	63,819
United States.....	24,362	7,013	France.....	11,889	14,118

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Hardware (except cutlery and electroplated ware—Continued.)			Instruments, apparatus, and appliances and parts of—Continued.		
All other.....	\$5,676,986	\$6,773,238	Optical—Continued.		
United Kingdom.....	3,965,509	4,756,215	Belgium.....	\$1,348	\$1,504
Germany.....	950,491	1,056,459	France.....	40,806	52,475
Belgium.....	103,243	119,872	Austria-Hungary.....	7,392	8,550
France.....	42,593	65,192	United States.....	1,978	2,152
Austria-Hungary.....	107,676	134,354	Photographic.....	326,588	394,620
United States.....	293,304	374,073	United Kingdom.....	303,572	384,632
Hides and skins, raw:			Germany.....	14,361	12,541
Hides:	90,444	53,215	France.....	1,066	3,217
United Kingdom.....	2,871	2,711	United States.....	3,246	3,557
Germany.....	745	.....	Scientific and philosophical.....	446,784	446,073
United States.....	127	404	United Kingdom.....	388,512	400,245
Skins:	59,386	438,623	Germany.....	28,176	23,486
United Kingdom.....	3,090	13,952	France.....	2,453	1,377
Germany.....	718	.....	Austria-Hungary.....	2,195	8,624
United States.....	180	788	United States.....	8,210	8,881
Hops.....	93,588	46,373	Surgical.....	351,807	394,698
United Kingdom.....	52,802	36,508	United Kingdom.....	301,251	308,127
Germany.....	14,731	910	Germany.....	20,717	37,248
Austria-Hungary.....	15,252	3,192	France.....	599	1,325
United States.....	9,212	5,631	Austria-Hungary.....	3,799	9,611
Instruments, apparatus, and appliances, and parts of:			United States.....	24,386	35,063
Electrical (except telegraphic and telephone, not machinery)—			All other.....	134,393	213,712
Electric fans, and parts of	277,667	400,119	United Kingdom.....	119,161	173,418
United Kingdom.....	98,313	157,324	Germany.....	6,088	10,127
Germany.....	12,911	20,707	France.....	1,187	7,163
Austria-Hungary.....	3,562	19,398	United States.....	5,733	16,707
United States.....	91,845	113,584	Iron and steel, and manufactures of:		
Electric lamps, and parts of.....	238,429	246,775	Iron—	230,424	274,665
United Kingdom.....	161,475	203,322	United Kingdom.....	208,014	272,354
Germany.....	39,044	43,704	Germany.....	24	1,338
Belgium.....	4,541	1,228	Angle, bolt, and rod.....	61,255	54,198
Austria-Hungary.....	12,098	26,016	United Kingdom.....	16,697	32,727
United States.....	13,300	3,606	Germany.....	6,677	3,329
Electric wires and cables.....	733,284	770,518	Belgium.....	24,590	6,030
United Kingdom.....	641,706	701,788	Bars and channels.....	944,193	1,130,537
Germany.....	72,229	26,522	United Kingdom.....	336,222	340,943
Belgium.....	7,704	14,951	Sweden.....	141,795	134,690
Austria-Hungary.....	12,319	7,168	Germany.....	21,432	75,460
All other.....	1,435,754	20,634	Belgium.....	444,302	487,385
United Kingdom.....	1,199,665	1,592,982	United States.....	.....	1,353
Germany.....	136,291	119,127	Iron or steel—		
Belgium.....	8,268	9,933	Beams, bridgework, etc.....	2,608,614	3,748,981
France.....	3,343	9,796	United Kingdom.....	1,627,324	2,566,310
Austria-Hungary.....	5,193	11,694	Germany.....	546,849	764,985
United States.....	68,737	254,747	Belgium.....	352,982	337,467
Musical—			France.....	61,245	52,368
Organs and harmoniums.....	19,631	19,496	United States.....	11,237	15,685
United Kingdom.....	8,074	5,085	Bolts and nuts.....	559,127	736,336
Germany.....	1,475	1,698	United Kingdom.....	361,634	435,853
France.....	4,287	3,276	Germany.....	84,906	144,885
United States.....	3,650	4,706	Belgium.....	88,551	133,196
Pianos and piano players.....	142,321	146,488	France.....	1,786	2,112
United Kingdom.....	63,114	70,014	United States.....	20,994	14,882
Germany.....	56,622	62,510	Hoops and strips.....	1,167,955	1,400,929
Austria-Hungary.....	13,826	8,390	United Kingdom.....	760,571	1,028,754
United States.....	4,866	1,562	Germany.....	151,363	209,118
Talking machines and accessories.....	234,122	347,527	Belgium.....	88,220	105,214
United Kingdom.....	130,266	258,285	Austria-Hungary.....	.....	16,940
Germany.....	44,098	38,586	United States.....	167,505	40,737
France.....	8,103	2,497	Nails, rivets, and washers.....	1,454,782	1,627,747
Austria-Hungary.....	1,382	6,867	United Kingdom.....	437,128	570,067
United States.....	2,234	1,260	Sweden.....	155,353	93,892
All other (including parts).....	283,342	230,380	Norway.....	100,960	81,100
United Kingdom.....	137,148	84,896	Germany.....	198,412	315,278
Germany.....	85,558	79,752	Belgium.....	162,926	195,069
France.....	35,326	35,978	France.....	18,600	25,432
Austria-Hungary.....	7,266	10,375	Austria-Hungary.....	106,401	162,249
United States.....	6,672	10,813	United States.....	120,796	170,775
Optical.....	186,732	228,297	Pipes and fittings, cast—	1,852,861	2,939,819
United Kingdom.....	102,285	112,426	United Kingdom.....	1,092,889	2,920,936
Germany.....	11,422	16,698	Germany.....	259,964	265,638

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Iron and steel, and manufactures of—Continued.			Jewelry (except imitation, precious stones, pearls, and gold and silver plate):		
Iron or steel—Continued.			Jewelry.....	\$511,112	\$422,320
Rails, chains, etc (except for railways).....	\$348,295	\$647,921	United Kingdom.....	237,816	250,206
United Kingdom.....	89,904	215,897	Germany.....	39,789	49,828
Germany.....	166,021	279,541	France.....	62,408	.....
Belgium.....	77,859	151,591	United States.....	504	579
Screws.....	311,553	379,475	Plate, gold and silver.....	205,848	214,121
United Kingdom.....	263,764	316,430	United Kingdom.....	159,533	160,259
Germany.....	2,672	9,767	Germany.....	506	667
Belgium.....	20,011	18,853	France.....	988	3,168
France.....	2,482	1,903	Austria-Hungary.....	1,251	2,297
United States.....	22,551	32,494	United States.....	238	1,796
Sheets and plates, galvanized.	11,772,720	17,446,193	Jute, manufactures of:		
United Kingdom.....	11,048,434	17,266,571	Canvas.....	245,218	231,874
Germany.....	68,700	54,146	United Kingdom.....	242,756	228,219
Belgium.....	23,354	25,311	Germany.....	745	.....
United States.....	630,397	98,201	Austria-Hungary.....	1,226	678
Sheets and plates, tinned.	3,419,724	4,073,601	Gunny sacks.....	373,085	392,780
United Kingdom.....	3,106,953	4,059,527	United Kingdom.....	33,530	70,871
United States.....	251,408	3,407	Ceylon.....	283,576	289,469
All other sheets and plates.....	3,428,235	4,002,886	Austria-Hungary.....	925	2,355
United Kingdom.....	1,329,489	1,659,983	Gunny cloth.....	24,503	48,592
Germany.....	1,314,670	1,541,999	United Kingdom.....	14,828	31,014
Belgium.....	692,956	726,710	United States.....	131	784
Austria-Hungary.....		12,507	Rope and twine:	17,549	12,249
United States.....	90,196	62,919	United Kingdom.....	12,624	9,407
Tubes and fittings, wrought.	1,089,590	1,508,386	Germany.....	1,416	813
United Kingdom.....	947,439	1,064,586	Belgium.....	944	433
Germany.....	65,177	235,811	Austria-Hungary.....	725	501
Belgium.....	17,304	84,502	All other.....	74,341	135,707
United States.....	55,512	123,142	United Kingdom.....	62,111	112,129
Wire.	732,442	779,949	Germany.....	895	10,298
United Kingdom.....	271,565	359,075	Belgium.....	3,280	2,949
Germany.....	228,088	186,538	France.....	438	511
Belgium.....	109,496	71,007	Austria-Hungary.....	1,285	672
Austria-Hungary.....	41,891	45,735	Leather:		
United States.....	77,703	109,287	Hides, tanned or dressed.....	153,178	117,176
Other manufactures.	1,339,266	1,927,012	United Kingdom.....	97,525	74,687
United Kingdom.....	1,082,913	1,425,023	Germany.....	3,562	165
Germany.....	115,312	261,083	Austria-Hungary.....	1,178	.....
Belgium.....	103,841	210,174	United States.....	3,874	2,146
France.....	3,557	720	Skins, tanned or dressed:		
Austria-Hungary.....	8,964	594	United Kingdom.....	298,788	381,592
United States.....	22,843	28,702	Germany.....	246,094	318,172
Steel—			Belgium.....	43,969	41,482
Angle and spring.....	1,049,646	1,518,655	France.....	754	5,567
United Kingdom.....	617,277	654,053	United States.....	2,414	4,205
Germany.....	210,812	446,959	United States.....	3,275	5,884
Belgium.....	211,201	398,610	Unwrought:		
United States.....	10,210	18,493	United Kingdom.....	257,530	187,307
Bars and channels.	4,093,773	6,701,385	Germany.....	219,713	159,195
United Kingdom.....	737,030	1,009,799	Belgium.....	16,989	6,755
Germany.....	1,317,147	2,614,469	United States.....	4,628	8,825
Belgium.....	1,957,082	2,993,992	Manufactures (except boots and shoes and belting for machinery):		
United States.....	32,002	40,051	Bags and trunks.....	116,572	95,233
Cast.	278,631	422,587	United Kingdom.....	94,493	86,006
United Kingdom.....	205,765	286,802	Germany.....	4,399	3,037
Germany.....	27,491	88,463	Austria-Hungary.....	14,293	2,365
Belgium.....	17,811	24,970	Saddlery and harness:		
France.....	1,110	6,288	United Kingdom.....	172,284	182,337
Austria-Hungary.....	9,840	141	Germany.....	165,709	156,278
United States.....	2,224	1,869	United States.....	925	500
Ivory:			United States.....	2,034	1,859
Unmanufactured.....	639,152	629,881	All other.....	390,950	354,169
United Kingdom.....	311,256	322,829	United Kingdom.....	305,256	288,364
Germany.....	179,691	180,489	Germany.....	19,077	24,177
France.....	2,497	17,116	France.....	1,572	2,054
Manufactured.	84,366	114,874	Austria-Hungary.....	22,011	12,546
United Kingdom.....	18,653	50,797	United States.....	12,887	8,828
Germany.....	53,274	48,154	Liquors (except methylated and perfumed spirits):		
France.....	4,876	10,063	Ale, beer, and porter.....	2,196,816	2,138,267
			United Kingdom.....	1,680,868	1,603,974
			Germany.....	614,715	516,287

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Liquors (except methylated and perfumed spirits)— Continued.			Machinery and millwork: Prime movers (except electrical)—		
Ale, beer, and porter—Con.			Locomotives (except railway)...	\$349,055	\$594,326
Belgium.....	\$3,494	\$5,324	United Kingdom.....	301,718	503,717
Austria-Hungary.....	1,596	2,195	Germany.....	44,908	90,210
United States.....	1,202	1,363	All other.....	1,592,090	2,694,080
Spirits—			United Kingdom.....	1,517,740	2,492,509
Brandy.....	996,153	1,035,572	Germany.....	37,613	134,306
United Kingdom.....	64,880	86,424	Austria-Hungary.....	1,280	21,043
Germany.....	61,459	69,576	United States.....	22,688	33,997
France.....	857,497	867,205	Electrical (except instruments, etc.)—		
Gin.....	123,230	127,828	Generators.....	185,273	101,622
United Kingdom.....	88,585	92,707	United Kingdom.....	155,723	97,607
Germany.....	8,181	6,219	Germany.....	827	1,303
Netherlands.....	24,610	26,226	Austria-Hungary.....	28,722	623
Liqueurs—			United States.....		1,037
United Kingdom.....	87,957	96,026	Motors.....	483,221	450,429
Germany.....	43,073	46,188	United Kingdom.....	368,190	403,050
France.....	13,412	12,025	Germany.....	59,381	25,695
United States.....	23,915	28,620	France.....	3,582	1,455
Rum.....	1,265	1,669	Austria-Hungary.....	17,583	253
United Kingdom.....	43,025	48,285	United States.....	20,989	13,140
Germany.....	14,891	14,999	All other.....	503,542	1,128,259
Java.....	14,619	20,274	United Kingdom.....	441,572	948,578
Whisky.....	11,402	11,276	Germany.....	29,364	145,109
United Kingdom.....	1,391,761	1,516,946	Belgium.....	2,492	12,118
Germany.....	1,376,823	1,497,646	United States.....	13,198	8,662
United States.....	1,075	823	Agricultural.....	97,194	86,084
Spirits present in drugs, medicines, or chemicals.....	652,885	710,968	United Kingdom.....	40,718	82,862
United Kingdom.....	411,263	456,010	Germany.....	13,320	934
Germany.....	18,787	20,678	United States.....	3,100	1,158
France.....	27,048	35,690	Boilers.....	916,732	1,153,103
Austria-Hungary.....	7,548	6,288	United Kingdom.....	901,008	1,094,958
United States.....	181,832	181,976	Germany.....	4,214	13,037
Perfumed spirits.....	281,508	361,415	Belgium.....		6,813
United Kingdom.....	180,114	206,651	United States.....	10,818	32,099
Germany.....	44,405	55,342	Metal working.....	49,487	47,356
Belgium.....	6,730	10,020	United Kingdom.....	37,102	39,944
France.....	34,293	67,776	Germany.....	2,740	311
Austria-Hungary.....	1,485	3,279	United States.....	3,353	6,161
United States.....	8,769	10,726	Mining—		
All other.....	213,946	252,479	Coal.....	76,428	44,553
United Kingdom.....	92,566	104,080	United Kingdom.....	75,577	35,448
Germany.....	25,437	26,537	Germany.....		8,589
France.....	4,195	6,390	United States.....		516
Austria-Hungary.....	2,118	3,416	All other.....	229,553	421,171
United States.....	1,155	1,226	United Kingdom.....	169,014	276,670
Wines—			Germany.....	4,667	1,601
Champagne and other sparkling wines.....	274,539	300,891	United States.....	52,529	133,184
United Kingdom.....	80,249	96,113	Oil crushing and refining.....	178,727	104,425
Germany.....	8,127	4,380	United Kingdom.....	118,869	74,112
Belgium.....	14,580	21,977	Germany.....	5,110	14,711
France.....	168,756	173,301	United States.....	53,677	15,553
Port.....	218,620	251,661	Refrigerating.....	166,284	109,375
United Kingdom.....	194,611	202,991	United Kingdom.....	142,618	63,649
Germany.....	6,944	5,290	Germany.....	10,341	31,715
France.....	3,935	3,820	Rice and flour mill.....	499,702	518,827
Portugal.....	44,285	23,067	United Kingdom.....	274,437	213,778
Other still red wines.....	98,376	92,867	Germany.....	175,851	235,125
United Kingdom.....	21,476	25,072	Belgium.....	1,562	1,805
Germany.....	2,903	4,258	France.....		1,805
France.....	57,634	47,234	United States.....	47,755	67,039
Austria-Hungary.....	1,100	711	Sawmill and woodworking.....		
Sherry, madeira, and marsala.....	79,762	81,966	United Kingdom.....	\$2,920	86,303
United Kingdom.....	61,459	69,031	Germany.....	77,319	78,675
Germany.....	1,192	1,071	United States.....	2,214	4,691
France.....	2,156	1,007	United States.....	3,261	2,730
Other still white wines.....	28,089	27,189	Sewing and knitting machines, and parts—		
United Kingdom.....	6,429	9,475	Sewing and knitting machines—		
Germany.....	10,755	8,400	United Kingdom.....	819,606	872,768
France.....	7,587	5,149	Germany.....	277,614	270,806
All other wines (including Vermouth).....	191,122	180,993	Belgium.....	4,492	12,779
United Kingdom.....	45,589	39,166	United States.....	2,993	2,263
Germany.....	3,518	1,757	Parts and accessories.....	87,135	158,317
France.....	117,375	122,568	United Kingdom.....	76,078	146,068
Italy.....	18,264	21,354	Germany.....	10,570	10,478
			United States.....	341	871

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Machinery and millwork— Continued.			Metals and ores (except iron and steel), and manufactures of— Continued.		
Sugar machinery.....	\$65,717	\$151,616	Copper—		
United Kingdom.....	65,386	122,154	Tiles, ingots, etc.....	\$438,545	\$1,455,614
Germany.....	331	28,557	United Kingdom.....	142,696	161,874
United States.....		900	Germany.....	336	
Tea machinery.....	577,508	692,201	Japan.....	295,450	1,289,856
United Kingdom.....	547,958	667,436	Braziers and sheets.....	1,319,946	4,244,039
Germany.....	2,190	1,815	United Kingdom.....	836,240	2,392,581
Belgium.....	3,854		Germany.....	330,896	770,664
United States.....	112	78	Belgium.....	12,181	224,034
Textile machinery—			France.....	129,517	810,890
Cotton.....	3,684,549	5,799,384	Japan.....	117	43,044
United Kingdom.....	3,587,861	5,647,787	Mixed or yellow metal.....	5,251,703	6,674,892
Germany.....	50,548	48,519	United Kingdom.....	2,513,757	3,344,901
Belgium.....	2,983	5,256	Germany.....	2,717,439	3,277,972
Austria-Hungary.....	8,682	8,468	Belgium.....	968	17,091
Japan.....	9,276	35,457	Italy.....	18,940	34,649
United States.....	21,052	35,842	Wire (except telegraph and telephone).....	114,830	164,570
Jute.....	2,803,727	4,727,070	United States.....	80,521	76,219
United Kingdom.....	2,803,727	4,714,763	Germany.....	14,356	47,843
Germany.....		12,020	Belgium.....	13,884	28,415
Belgium.....		287	France.....	696	818
Other.....	141,581	114,791	Austria-Hungary.....	529,062	779,555
United Kingdom.....	131,658	107,973	United Kingdom.....	375,850	604,205
Germany.....	6,677	1,017	Germany.....	106,367	115,830
France.....	438	3,290	Belgium.....	9,110	22,566
United States.....	2,672	2,185	France.....	7,611	15,621
Typewriters, and parts of—			Austria-Hungary.....	26,114	15,065
Typewriters.....	319,384		United States.....	44	243
United Kingdom.....	78,448	80,657	German silver.....	421,575	718,825
Germany.....	2,973	2,973	United Kingdom.....	218,019	326,917
Belgium.....	39		Germany.....	92,858	144,224
Austria-Hungary.....	1,304	1,241	Belgium.....	365	
United States.....	234,171	287,619	Austria-Hungary.....	109,870	245,369
Parts and accessories.....	37,574	41,609	Lead, and manufactures of:		
United Kingdom.....	9,762	11,222	Ore.....	17,957	19,490
Germany.....	321	1,650	United Kingdom.....	4,963	10,010
United States.....	27,462	28,707	Germany.....	5,640	5,669
All other (except printing machinery).....	3,343,772	4,319,987	France.....	7,353	3,810
United Kingdom.....	2,892,998	3,797,053	Pig.....	218,160	233,125
Germany.....	219,703	315,072	United Kingdom.....	81,733	133,532
Belgium.....	22,610	11,266	France.....	16,390	16,823
France.....	3,971	8,677	Sheets, pipes, and tubes.....	99,437	120,884
Austria-Hungary.....	1,440	42,596	United Kingdom.....	92,371	111,178
United States.....	152,591	172,610	Germany.....	4,051	3,986
Matches:			Belgium.....	2,754	2,711
Safety.....	1,798,274	2,006,876	Sheets for tea chests.....	227,833	277,717
United Kingdom.....	6,774	13,271	United Kingdom.....	226,211	268,387
Sweden.....	372,866	381,383	Germany.....	6,448	
Norway.....	9,636	13,870	Belgium.....	1,786	
Germany.....	56,909	32,265	All other manufactures.....	60,272	85,816
Belgium.....	30,231	57,833	United Kingdom.....	45,215	69,138
Austria-Hungary.....	210,870	280,145	Germany.....	2,214	3,040
Japan.....	1,159,886	1,195,801	France.....	10,288	9,198
All other.....	1,426,824	901,592	United States.....	1,586	647
United Kingdom.....	10,200	16,074	Quicksilver.....	201,960	100,109
Sweden.....	641,979	505,537	United Kingdom.....	165,670	81,509
Norway.....	361,732	214,549	Austria-Hungary.....	34,693	18,259
Germany.....	52,154	49,030	United States.....	1,080	
Belgium.....	46,962	10,239	Zinc or spelter—		
Austria-Hungary.....	53,128	33,482	Unwrought.....	480,966	625,798
Japan.....	112,105	71,703	United Kingdom.....	417,171	556,664
Metals and ores (except iron and steel), and manufactures of:			Germany.....	41,769	65,357
Aluminum.....	827,777	693,613	Belgium.....	18,473	14,814
United Kingdom.....	151,124	197,852	Wrought, or manufactured.....	315,992	289,820
Germany.....	455,339	333,404	United Kingdom.....	95,014	73,153
Belgium.....	33,121	20,288	Germany.....	79,762	88,950
France.....	2,944	42,606	Belgium.....	137,775	120,899
United States.....	184,192	92,279	United States.....	1,226	258
Brass, bronze, etc., wrought			All other metals.....	171,612	167,456
United Kingdom.....	185,380	260,698	United Kingdom.....	144,910	135,761
Germany.....	46,845	93,909	Germany.....	14,873	19,019
Belgium.....	9,889	20,074	Belgium.....	5,066	1,698
France.....	5,212	8,915	France.....	39	
Italy.....	39,628	51,152	Austria-Hungary.....	3,879	6,711
Austria-Hungary.....	13,605	23,734	United States.....	555	1,037
United States.....	1,299	1,562			

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Motor cars and cycles, and parts of:			Oilcloth and floor cloth.	\$341,799	\$367,143
Motor cars.	(e)	\$3,680,855	United Kingdom.....	263,734	266,465
United Kingdom.....		2,506,924	Germany.....	17,271	17,310
Germany.....		95,422	Belgium.....	29,048	44,032
Belgium.....		182,377	Austria-Hungary.....		642
France.....		158,502	United States.....	39,297	38,007
Austria-Hungary.....		10,555	Packing, engine and boiler	189,185	175,228
United States.....		682,337	(including asbestos).	173,204	146,681
Motor cycles.		346,490	United Kingdom.....	5,134	11,281
United Kingdom.....		333,457	Germany.....	4,005	5,621
Germany.....		2,710	Belgium.....	258	1,781
Belgium.....		1,299	Austria-Hungary.....	2,487	4,789
France.....		1,134	United States.....		
United States.....		2,409	Paints and painters' materials:		
Motor wagons.		185,165	Paints and colors—		
United Kingdom.....		115,307	Barytes.....	12,852	5,801
Germany.....		21,773	United Kingdom.....	3,460	4,419
Belgium.....		6,653	Germany.....	3,290	1,256
France.....		4,916	Belgium.....	2,501	127
Austria-Hungary.....		8,903	White and red lead.	347,809	384,001
United States.....		21,325	United Kingdom.....	270,354	289,768
Total motor cars and motor cycles.	\$2,906,162		Germany.....	56,568	39,170
United Kingdom.....	2,189,483		Belgium.....	20,147	54,875
Germany.....	57,293		United States.....	574	
Belgium.....	196,636		All other.	1,580,002	1,689,016
France.....	77,121		United Kingdom.....	1,311,342	1,365,496
Austria-Hungary.....	5,932		Germany.....	97,340	99,306
United States.....	336,694		Belgium.....	38,791	49,414
Parts and accessories.	1,270,166	701,257	Austria-Hungary.....	2,161	2,263
United Kingdom.....	906,420	569,035	United States.....	33,379	45,799
Germany.....	201,653	47,867	All other painters' materials—		
Belgium.....	39,781	30,630	Turpentine.....	149,061	137,814
France.....	87,938	49,419	United Kingdom.....	127,259	107,190
Austria-Hungary.....	219	1,301	Germany.....	258	081
United States.....	23,544	46,626	United States.....	20,337	29,914
Oils:			All other.	389,792	454,439
Essential.	166,172	190,256	United Kingdom.....	331,837	389,296
United Kingdom.....	40,144	46,417	Germany.....	19,631	31,924
Germany.....	57,541	77,810	Belgium.....	12,843	6,477
Belgium.....	509	647	Austria-Hungary.....	3,595	2,896
France.....	31,121	29,924	United States.....	5,723	10,239
Austria-Hungary.....	6,487	2,506	Paper and pasteboard:		
Mineral—			Paper—		
Kerosene (in bulk).....	6,053,814	6,366,477	Packing.....	317,855	359,347
Russia.....	1,412,944	123,872	United Kingdom.....	67,601	120,480
Borneo (Dutch).....	1,477,771	5,355,120	Russia.....	13,427	13,251
United States.....	2,019,607	405,647	Sweden.....	31,851	28,776
Kerosene (in cans).....	2,236,843	3,075,871	Norway.....	46,577	60,330
United States.....	2,209,994	2,872,383	Germany.....	114,402	85,407
Lubricating.	2,467,676	2,576,899	Belgium.....	19,889	17,821
United Kingdom.....	608,278	709,356	Austria-Hungary.....	16,994	21,198
Germany.....	39,146	46,300	United States.....	380	647
Belgium.....	33,482	30,927	Printing.	1,407,382	1,563,195
France.....	107	326	United Kingdom.....	869,985	839,529
Austria-Hungary.....	5,382	2,516	Sweden.....	86,700	77,124
United States.....	1,405,791	1,416,043	Norway.....	95,992	163,772
Petroleum, dangerous.	16,901	13,631	Germany.....	222,229	318,576
United Kingdom.....		10	France.....	150	
United States.....	16,376	13,490	Austria-Hungary.....	142,102	139,250
Paints, solutions, and compositions, dangerous.	1,202	1,947	United States.....	3,285	3,377
United Kingdom.....	1,046	1,630	Writing, and envelopes.	1,092,325	1,265,115
United States.....	131	784	United Kingdom.....	721,614	800,846
All other.....	1,400,019	1,492,770	Sweden.....	3,226	16,653
United Kingdom.....	39,521	41,414	Norway.....	5,952	10,879
Germany.....	804,651	920,844	Germany.....	86,614	123,507
Belgium.....	73,309	78,847	Belgium.....	75,674	65,104
France.....	968	443	France.....	603	1,270
Austria-Hungary.....	44		Austria-Hungary.....	150,365	162,736
United States.....	71,567	115,832	United States.....	11,183	13,801
Vegetable—			All other paper (including manufacturing manufactures).	1,657,097	1,658,610
Linsseed.....	274,475	286,233	United Kingdom.....	1,048,765	1,049,023
United Kingdom.....	273,473	285,454	Sweden.....	31,452	41,307
Germany.....	506	448	Norway.....	19,714	20,410
All other.....	51,327	81,261	Germany.....	317,758	290,530
United Kingdom.....	17,622	22,342	Belgium.....	64,325	64,257
Germany.....	2,759	2,886	France.....	3,908	3,295
France.....	3,918	13,938	Austria-Hungary.....	60,617	80,798
United States.....	5	2,535	United States.....	34,440	24,946

* Statistics for 1912-13 do not state separately the value of the several kinds of motor vehicles; the total value alone is given. For 1913-14 the contrary is true.

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Paper and pasteboard—Con.			Prints, engravings, and pictures—Continued.		
Pasteboard, millboard, and cardboard	\$216,486	\$277,133	All other	\$86,030	\$79,533
United Kingdom	77,183	86,268	United Kingdom	56,335	44,777
Germany	59,182	71,917	Germany	16,244	24,148
Netherlands	57,376	79,971	Belgium	44	2,088
Belgium	3,251	4,779	France	3,922	642
France	822	735	Austria-Hungary	676	224
Austria-Hungary	2,107	978	United States	1,124	526
United States	4,857	2,939	Provisions and oilman's stores:		
Paper-making material:			Bacon and hams	362,355	400,469
Pulp of wood, etc.	535,553	563,584	United Kingdom	355,624	394,318
United Kingdom	76,097	215,260	Germany	482	1,129
Sweden	317,189	100,425	Biscuits and cakes	1,468,150	1,453,779
Germany	61,634	98,532	United Kingdom	1,321,668	1,299,606
Austria-Hungary	75,971	119,234	Germany	83,100	69,095
Paraffin wax	24,649	57,863	France	1,241	1,134
United Kingdom	1,363	2,409	United States	273	88
Germany	886	24	Butter (including canned)	114,528	138,754
United States	22,376	55,366	United Kingdom	26,629	25,637
Perfumery (not perfumed spirits)	148,983	162,887	Denmark	69,011	75,771
United Kingdom	4,459	16,152	Germany	2,832	4,677
Germany	10,794	749	France	19,101	16,361
Belgium	5,611	1,110	Cheese (including canned)	277,858	247,938
France	16,118	3,066	United Kingdom	108,065	104,727
Austria-Hungary	146	3,718	Germany	144,691	118,348
Persia	50,529	54,038	Netherlands	1,543	3,480
Pitch tar and dammar	405,504	408,781	Belgium	2,141	1,027
United Kingdom	324,790	289,425	France	234	788
Germany	453	2,930	Austria-Hungary	169,719	188,845
United States		535	Cocoa and chocolate	145,839	147,358
Polishes:			United Kingdom	2,161	15,913
For application to leather	198,865	199,960	Germany	9,412	9,251
United Kingdom	192,519	191,239	Belgium	1,411	1,207
Germany	4,039	4,112	France		
Austria-Hungary	837	1,713	Farinaceous and patent foods	1,383,634	1,549,148
United States	939	2,093	United Kingdom	494,928	542,332
For application to metals	114,343	153,339	Strait Settlements (including Labuan)	753,203	832,371
United Kingdom	101,009	130,568	Germany	2,013	2,784
Germany	10,361	16,103	Belgium	3,197	3,163
Belgium	1,353	3,572	France	331	1,723
United States	2,754	2,467	Austria-Hungary	735	511
Precious stones and pearls, unset	3,511,564	3,478,053	China	26,209	32,805
United Kingdom	6,691	8,249	United States	51,887	40,971
Germany	341	3,713	Lard	48,879	45,777
Austria-Hungary	2,328	779	United Kingdom	8,224	14,410
Arabia	621,452	920,839	United States	6,054	2,881
Persia	427,279	52,753	Milk, condensed and preserved	1,195,991	1,346,731
Italian East Africa	42,640	4,867	United Kingdom	807,007	779,969
United States	42,040	41,365	Germany	69,445	109,564
Printing and lithographing machinery and materials (except paper):			Netherlands	175,257	317,963
Presses	236,225	264,027	Belgium	58,928	71,372
United Kingdom	204,296	212,992	France	482	1,533
Germany	6,302	20,571	Switzerland	40,956	20,123
France	112	701	Austria-Hungary	4,755	4,954
United States	22,843	29,593	United States	2,000	3,348
Type	101,476	115,200	Pickles, etc.	120,405	117,701
United Kingdom	92,736	107,058	United Kingdom	115,862	104,455
Germany	1,032	2,006	France	394	380
Austria-Hungary	1,937	.....	United States	2,886	1,533
United States	3,192	3,942	All other—		
All other	177,686	210,938	Canned and bottled, n.e.s.	1,398,778	1,839,260
United Kingdom	145,781	166,137	United Kingdom	891,922	1,058,157
Germany	25,257	29,457	Germany	16,809	25,033
Belgium	623	2,428	Belgium	20,999	10,969
Austria-Hungary	2,414	4,944	France	44,785	62,432
United States	3,007	7,061	Austria-Hungary	910	2,550
Prints, engravings, and pictures:			United States	82,828	97,992
Photographs and post cards	26,133	28,357	All other	656,184	382,001
United Kingdom	14,016	18,006	United Kingdom	395,890	196,180
Germany	8,156	8,400	Germany	7,368	6,005
France	1,110	5	Belgium	2,321	647
Austria-Hungary	866	1,032	France	20,728	8,784

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Railway plant and rolling stock:			Silk:	\$5,562,233	\$4,084,497
Carriages, wagons, and parts of:	\$7,710,638	\$15,235,002	Raw.....	9,295	1,543
United Kingdom.....	7,275,310	14,541,282	United Kingdom.....	936,845	689,705
Germany.....	314,361	564,032	Germany.....	1,523	2,316
Belgium.....	106,593	122,504	Belgium.....	2,117	2,730
United States.....	993	—	France.....	5,801	4,482
Locomotives, tenders, and parts of:	2,932,767	6,175,389	Austria-Hungary.....	1,333	1,105
United Kingdom.....	2,899,952	5,854,623	Siam.....	133,590	106,299
Germany.....	32,250	285,883	China.....	4,271,356	3,083,702
Belgium.....	565	34,883	Yarn, noids, and warps.....	1,328,199	1,486,458
Materials for construction—			United Kingdom.....	107,939	104,274
Bridge work:			Germany.....	10,643	14,405
United Kingdom.....	1,261,913	672,575	Belgium.....	8,847	11,869
Belgium.....	1,261,431	646,918	France.....	18,989	5,343
Rails, chairs, and fish plates of steel or iron.	3,774,423	4,274,310	Switzerland.....	23,252	26,858
United Kingdom.....	3,742,008	4,252,241	Italy.....	416,752	318,152
Germany.....	32,421	22,070	Austria-Hungary.....	10,220	68,681
Sleepers and keys of steel or iron.	2,602,672	3,137,880	China (except Hong-kong and Macao).....	77,562	85,164
United Kingdom.....	2,526,891	3,058,732	Japan.....	653,936	849,832
Germany.....	75,781	28,342	Manufactures—		
Belgium.....		50,806	Goods mixed with other materials.....	1,893,789	2,255,647
Sleepers of wood:	1,179,503	1,241,702	United Kingdom.....	533,802	624,129
United Kingdom.....	11,938	181,885	Germany.....	541,145	686,483
Australia.....	1,044,010	948,092	Belgium.....	6,429	43,288
United States.....	42,377	9,422	France.....	631,511	543,646
Other kinds of materials.	1,310,237	1,819,025	Italy.....	153,270	294,175
United Kingdom.....	1,254,584	1,730,153	Austria-Hungary.....	4,599	8,789
Germany.....	38,421	70,076	Silk piece goods.....	6,606,026	6,224,176
Belgium.....	17,495	7,884	United Kingdom.....	127,823	128,276
France.....		141	Hongkong.....	676,298	794,077
United States.....	1,139	1,728	Germany.....	12,478	14,614
Rubber, manufactures of:			Belgium.....	861	200
Tires for motors and motor cycles.	(a)	554,333	France.....	247,729	245,627
United Kingdom.....		261,039	Austria-Hungary.....	2,915	2,905
Germany.....		78,774	China (except Hong-kong and Macao).....	1,446,650	1,158,752
Belgium.....		1,022	Japan.....	4,337,726	3,815,433
France.....		190,567	Thread (except sewing).....	68,146	88,911
Italy.....		15,203	United Kingdom.....	37,029	41,360
United States.....		1,601	Germany.....	3,762	11,139
Tubes for motor tires.		107,637	Belgium.....		871
United Kingdom.....		47,521	France.....	1,465	3,377
Germany.....		23,544	Austria-Hungary.....	1,436	1,567
France.....		36,139	Japan.....	17,154	25,316
All other (except apparel and boots and shoes).	638,140	1,053,651	United States.....	2,229	1,426
United Kingdom.....	523,704	720,412	Soap:		
Germany.....	57,152	263,258	Household and laundry, in bars or tablets.....	1,504,542	1,530,568
Belgium.....	10,740	5,99	United Kingdom.....	1,497,432	1,521,876
France.....	20,430	33,963	Germany.....	443	521
Austria-Hungary.....	10,400	6,122	France.....	647	652
United States.....	5,304	4,550	Austria-Hungary.....	555	136
Salt.....	2,757,111	2,844,138	United States.....	822	331
United Kingdom.....	711,297	603,406	Toilet.....	710,441	808,783
Aden and dependencies	650,753	513,573	United Kingdom.....	557,521	623,029
Germany.....	311,213	302,200	Germany.....	12,823	14,906
Spain.....	337,127	404,041	Belgium.....	1,411	3,747
Turkey (Red Sea)....	173,301	344,748	France.....	2,793	4,000
Egypt.....	422,879	368,336	Austria-Hungary.....	65,844	71,873
Italian East Africa.....	150,127	217,440	United States.....	37,248	52,373
Ships, parts of (including launches and boats).	473,579	732,822	Other.....	102,143	95,846
United Kingdom.....	447,961	690,342	United Kingdom.....	87,762	78,896
Germany.....	9,383	238	Germany.....	1,586	2,243
Belgium.....		9,378	France.....	4,292	2,506
Austria-Hungary.....	487	9,422	Austria-Hungary.....	910	15
United States.....	12,011	14,955	United States.....	2,112	2,725
Smokers' requisites (except tobacco).	219,367	181,228	Specimens, natural science.....	6,297	6,137
United Kingdom.....	92,123	75,708	United Kingdom.....	5,567	5,032
Germany.....	56,500	75,068	Germany.....		224
Belgium.....	6,696	3,455	United States.....		107
France.....	16,692	18,259	Spices:		
Austria-Hungary.....	23,403	19,992	Cardamoms.....	46,660	26,187
Japan.....	20,804	31,734	United Kingdom.....	1,012	19
			Ceylon.....	35,024	22,722
			United States.....	2,200	
			Cloves.....	845,223	1,093,249
			United Kingdom.....	3,455	15,252

* See under "Motor cars and cycles, and parts of"; tires and tubes are included, for 1912-13, under "Parts and accessories."

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Spices—Continued.			Tobacco—Continued.		
Cloves—Continued.			Manufactured—Contd.		
Zanzibar and Pemba..	\$750,458	\$1,059,568	Cigars—Continued.		
Germany.....	35,925	3,562	Philippines.....	\$18,245	\$20,006
United States.....	17,164	9,582	United States.....	857	39
Starch and farina.	349,697	319,272	Cigarettes.....	1,713,928	1,807,896
United Kingdom.....	69,654	77,932	United Kingdom.....	1,518,640	1,712,502
Germany.....	218,321	169,894	Germany.....	521	346
Belgium.....	9,086	12,015	France.....	618	297
Austria-Hungary.....		1,012	Austria-Hungary.....	857	2,754
Stationery (except paper).	2,044,971	2,270,359	Egypt.....	172,800	161,904
United Kingdom.....	1,463,274	1,613,503	United States.....	9,679	11,276
Germany.....	178,372	197,843	Other manufactures of tobacco.....	354,875	344,514
Belgium.....	16,527	16,055	United Kingdom.....	310,512	301,506
France.....	5,368	5,373	Austria-Hungary.....	579	5
Austria-Hungary.....	163,505	183,287	United States.....	40,192	39,375
Japan.....	69,270	99,004	Toilet requisites:		
United States.....	80,190	94,352	United Kingdom.....	321,768	349,643
Stone and marble.	120,402	156,881	Germany.....	91,330	98,522
United Kingdom.....	12,385	23,753	Belgium.....	2,754	3,119
Germany.....	10,492	15,471	France.....	20,050	23,531
Belgium.....	7,825	7,679	Austria-Hungary.....	21,481	28,557
France.....	866	268	United States.....	65,542	78,579
Italy.....	72,817	88,385	Toys and requisites for games and sports:		
Austria-Hungary.....	642	15	Toys.....	784,679	866,169
Sugar:			United Kingdom.....	224,667	199,629
No. 16 Dutch standard and above.....	43,707,272	46,120,117	Germany.....	330,484	343,040
United Kingdom.....	116,635	84,181	Belgium.....	4,492	5,840
Straits Settlements.....	248,123	188,966	France.....	14,449	16,682
Hongkong.....	174,829	109,720	Austria-Hungary.....	70,540	99,914
Mauritius and dependencies.....	10,331,507	9,987,688	United States.....	18,712	11,933
Germany.....	22,328	40,329	Requisites for games and sports:		
Belgium.....	24,766	1,611	Toys.....	193,132	204,174
France.....	2,151	3,017	Playing cards—		
Austria-Hungary.....	3,684,695	1,059,953	United Kingdom.....	15,826	16,532
Java.....	29,115,856	4,466,517	Germany.....	20,673	22,829
Candyfication.	858,008	854,314	Belgium.....	66,895	53,064
United Kingdom.....	814,822	818,793	Austria-Hungary.....	29,671	43,078
Germany.....	4,025	4,609	United States.....	48,159	52,738
Belgium.....	9,003	200	Other sorts—		
France.....	5,504	9,402	United Kingdom.....	381,972	362,603
Austria-Hungary.....	438	487	Germany.....	347,512	330,713
United States.....	10,040	5,402	Belgium.....	12,390	10,225
Saccharin.....	49,098	47,828	Austria-Hungary.....	3,961	3,562
United Kingdom.....	3,772	832	United States.....	4,015	2,964
Germany.....	11,397	14,517		3,056	3,514
France.....	4,837	1,771	Umbrellas and fittings:		
Austria-Hungary.....	9,310	22,133	Umbrellas (including parasols and sunshades).....	570,948	696,036
Tallow and stearine (including grease and animal fat).			United Kingdom.....	497,162	612,500
United Kingdom.....	617,496	678,565	Germany.....	8,224	5,996
Germany.....	442,535	398,698	France.....	29,102	31,438
Belgium.....	9,901	11,310	Austria-Hungary.....	1,285	3,655
France.....	66,846	165,865	Umbrella fittings.....	855,419	1,022,257
Austria-Hungary.....	12,473	7,110	United Kingdom.....	400,917	370,526
United States.....	15,952	11,855	Germany.....	230,857	300,025
Tea chests of wood.	1,302,476	1,690,126	Belgium.....	69,061	117,755
United Kingdom.....	1,330,214	1,599,365	France.....	1,027	2,467
Germany.....	8,862	34,100	Austria-Hungary.....	8,920	9,947
Telephone materials and accessories.	100,449	113,784	Wax, other than paraffin (except candles).	40,538	54,515
United Kingdom.....	93,729	104,785	United Kingdom.....	9,504	23,301
Germany.....	5,489	4,399	Germany.....	2,024	4,472
Belgium.....	355	2,672	France.....	10	—
United States.....	487	1,260	Austria-Hungary.....	808	560
Tobacco:			United States.....	200	686
Unmanufactured.....	78,832	91,208	Wood and timber:		
United Kingdom.....	13,782	3,908	Timber (except railway sleepers)—		
Germany.....	7,509	8,580	Deal and pine.....	363,245	781,336
Belgium.....	10,920	9,378	United Kingdom.....	35,521	147,221
Austria-Hungary.....	311	915	Germany.....	2,292	1,830
United States.....	9,582	26,698	Belgium.....		19
Manufactured—			Austria-Hungary.....	65,824	133,989
Cigars.....	103,588	108,966	United States.....	214,875	377,850
United Kingdom.....	16,702	20,945	Jarrah.....	164,059	195,701
Germany.....	10,502	7,417	Australia.....	134,004	164,536
Netherlands.....	48,543	50,801	Germany.....	12,011	—
Belgium.....	3,460	3,879	Austria-Hungary.....	16,935	—
Austria-Hungary.....	506	190			

Imports in detail—Continued.

Articles and principal countries of origin.	1912-13	1913-14	Articles and principal countries of origin.	1912-13	1913-14
Wood and timber—Contd.			Wool—Continued.		
Timber (except railway sleepers)—Continued.			Manufactures of—Contd.		
Teak.....	\$932,981	\$794,461	Carpets and rugs.....	\$546,245	\$728,724
Straits Settlements.....	24,522	8,974	United Kingdom.....	363,795	480,085
Germany.....		2,015	Germany.....	72,720	105,934
Java.....	105,394	75,679	Belgium.....	1,961	5,051
Siam.....	799,634	687,028	France.....	798	6,322
All other.....	411,604	649,843	Italy.....	71,061	91,281
United Kingdom.....	58,174	41,273	Austria-Hungary.....	3,956	5,091
Straits Settlements.....	175,900	351,191	Persia.....	20,556	19,846
Germany.....	394	1,041	Hosiery.....	301,890	468,678
Belgium.....		10	United Kingdom.....	342,251	393,885
Austria-Hungary.....	4,166	2,827	Germany.....	31,846	45,653
Siam.....	39,112	64,160	Belgium.....		647
United States.....	5,188	4,390	Austria-Hungary.....	12,896	17,261
Manufactures (except furniture and cabinet ware).	236,580	312,828	United States.....	837	457
United Kingdom.....	122,461	167,695	Piece goods.....	6,302,697	8,196,933
Germany.....	22,016	24,133	United Kingdom.....	4,358,228	5,672,100
Belgium.....	253	2,024	Germany.....	1,272,478	1,293,725
France.....	788	302	Netherlands.....	95,870	163,782
Austria-Hungary.....	12,648	13,032	Belgium.....	61,225	124,013
United States.....	13,840	25,252	France.....	362,618	710,952
Wool:			Italy.....	22,123	57,556
Yarn and knitting wool.....	649,731	799,167	Austria-Hungary.....	113,156	158,390
United Kingdom.....	92,931	81,222	Shawls.....	1,581,540	1,830,549
Germany.....	422,437	555,150	United Kingdom.....	252,313	261,706
Belgium.....	4,565	4,677	Germany.....	1,236,303	1,431,466
France.....	64,223	36,168	Belgium.....	1,625	3,669
Austria-Hungary.....	46,840	108,255	France.....	10,210	25,559
Manufactures of—			Italy.....	15,719	40,484
Braids.....	63,260	41,477	Austria-Hungary.....	54,636	63,761
United Kingdom.....	18,103	16,434	Other manufactures.....	392,206	432,656
Germany.....	1,684	2,005	United Kingdom.....	314,259	308,794
Belgium.....	4,949	5,450	Germany.....	41,891	52,344
Austria-Hungary.....	38,314	17,154	Belgium.....	1,056	1,523
			France.....	25,238	26,634
			Austria-Hungary.....	2,667	4,020

STATISTICS OF UNITED STATES.

Owing to transshipments of merchandise there is naturally a divergence in the statistical records of the Governments of India and the United States in the amount of traffic between the two countries. The fiscal years are nearly comparable, the Indian ending with March 31 and the American with June 30.

During the fiscal years 1912-13 and 1913-14 India's statistics showed shipments to the United States valued at \$61,252,000 and \$70,893,000, respectively, while our import figures showed receipts from India with a value (at point of origin) of \$67,949,259 and \$73,630,880.

For the same fiscal years India's statistics showed receipts of merchandise originating in the United States worth \$16,882,000 and \$15,361,000, while our export statistics showed shipments to India worth only \$11,040,039 and \$10,854,591.

The United States record of commerce with India is presented in the following summary:

Trade of the United States with British India, years ending June 30, 1913 and 1914.

Articles.	Quantities.		Values.	
	1913	1914	1913	1914
IMPORTS FROM INDIA.				
Chemicals, drugs, dyes, and medicines:				
Gums—				
Shellac..... lbs. free..	20,730,658	16,298,366	\$2,858,450	\$2,619,327
All other..... free..			118,867	242,191
Indigo..... lbs. free..	179,075	62,776	58,882	34,224
Potash—Nitrate of, or saltpeter, crude..... lbs. free..	6,166,353	3,433,863	207,358	113,177
All other..... free..			246,235	386,070
Coffee..... lbs. free..	4,000	17,800	23,097	12,488
Cotton:			701	2,944
Unmanufactured..... lbs. free..	807,157	3,059,386	92,649	373,049
Manufactures of..... dut..			31,150	13,380
Fibers, vegetable, and textile grasses, and manufactures of:				
Unmanufactured—				
Jute and jute butts..... tons. free..	120,511	100,576	8,740,667	10,501,863
All other..... tons. free..	357		37,448	225,376
Manufactures of—				
Bagging, gunny cloth, etc..... lbs. free..		3,089,562		180,499
Bags of jute..... lbs. dut..	2,709,421	1,758,432	137,514	74,221
Coir yarn..... lbs. free..	41,766,878	46,225,434	3,606,994	3,938,857
Fabrics, woven—Burlaps, etc..... lbs. free..	5,531,820	6,379,528	247,701	301,272
All other..... free..	354,652,149	322,872,348	31,118,939	26,255,827
All other..... dut..		105,045,517	389,755	9,016,780
Fruits and nuts..... free..		1,344		544,288
Hides and skins (except fur skins):			82	
Goat skins..... lbs. free..	41,124,364	35,698,332	8,253,206	7,473,877
All other..... lbs. free..	28,754,500	23,222,715	5,590,395	4,920,726
Hide cuttings, raw, and other glue stock..... free..			174,784	216,351
India rubber and gutta-percha, crude..... lbs. free..	464,141	7,236	116,162	3,360
Leather and tanned skins, and manufactures of:				
Skins for morocco..... free..				595,437
All other..... free..			871,005	189,668
Manganese oxide, and ore of..... tons. free..	167,319	115,685	845,871	124,324
Mattings and mats for floors, of straw, etc., sq. yds. dut..	111,290	431,996	28,760	3,879
Metals, metal compositions, and manufactures of..... dut..			6,371	1,700
Mica..... lbs. dut..	957,766	405,807	292,997	571,413
Oils, vegetable..... free..		3,284,446	327,524	4,240
All other..... dut..			9,855	152,844
Seeds:				330,224
Castor beans or seeds..... bush. dut..	833,720	905,946	919,379	992,115
Flaxseed or linseed..... bush. dut..	128,981	50	231,739	100
Spices, unground..... lbs. free..	2,655,617	190,850	210,979	14,280
Tea..... lbs. free..		3,830,172		329,939
Wood:				360,326
Unmanufactured..... free..			86,327	23,875
Manufactures of..... dut..			5,417	5,843
Wool:				
Unmanufactured..... lbs. free..		2,116,301		372,994
Manufactures of—				
Carpets and carpetings..... sq. yds. dut..	3,605,444	661,829	458,526	85,187
All other..... dut..				
All other free and dutiable articles.....			1,023,904	1,844,199
Total free of duty.....			29,522,672	57,579,796
Total dutiable.....			38,426,587	16,051,084
Total imports of merchandise.....			67,949,259	73,630,880
EXPORTS TO INDIA.				
Domestic exports:				
Breadstuffs.....			69,015	41,723
Cars, carriages, other vehicles, and parts of.....			397,756	463,826
Chemicals, drugs, dyes, and medicines—				
Medicines, patent or proprietary.....			355,650	295,992
All other.....			64,884	106,834

Trade of the United States with British India, years ending June 30, 1913 and 1914—Continued.

Articles.	Quantities.		Values.	
	1913	1914	1913	1914
EXPORTS TO INDIA—continued.				
Domestic exports—Continued.				
Clocks and watches, and parts of.....			\$131,189	\$143,290
Cotton—				
Unmanufactured.....lbs.	2,028,343		292,230	
Manufactures of—				
Cloths.....yds.	13,748,274	13,997,107	1,163,725	988,330
All other.....			38,048	33,203
Electrical machinery, appliances, and instruments.....			464,632	361,522
Instrumenta and apparatus for scientific purposes.....			10,316	12,741
Iron and steel, manufactures of—				
Builders' hardware and tools.....			333,546	321,551
Machinery, machines, and parts of—				
Mining machinery.....			279,777	505,661
Typewriting machines.....			222,258	256,143
All other machinery, and parts of.....			400,697	410,081
Pipes and fittings.....lbs.	7,016,721	11,767,749	187,067	314,643
Sheets and plates of iron.....lbs.	8,501,453	66,636	214,557	1,519
Structural iron and steel.....tons.	4,737	2,275	235,864	79,258
All other manufactures of.....			953,259	662,009
Lamps, chandeliers, etc. (except electric).....			417,443	551,638
Leather and tanned skins, and manufactures of.....			46,110	85,277
Meat and dairy products.....			18,383	7,443
Naval stores.....			72,285	57,689
Oils—Mineral—Refined—				
Illuminating.....galls.	31,440,972	33,201,784	2,079,517	2,501,473
Lubricating, etc.....galls.	8,650,217	7,772,135	1,111,928	1,127,488
All other.....galls.	127,726	35,875	22,102	6,678
Paper, manufactures of—Books, maps, etc.....			32,200	35,110
Perfumery, cosmetics, and all toilet preparations.....			41,592	22,715
Spirits, etc.—Malt liquors, in bottles.....doz. qts.	610	1,255	737	1,868
Tobacco, manufactures of.....			41,361	38,338
Wood, and manufactures of.....			305,146	325,928
All other articles.....			1,030,491	998,536
Total domestic exports.....			11,033,765	10,847,277
Total foreign exports.....			6,274	7,314
Total exports of merchandise.....			11,040,039	10,854,591

STEAMSHIP ROUTES.

The Indian port for the direct journey to and from Europe is Bombay. Before the war there were six lines of steamers by which an Indian trip via Bombay could be made, either by sea all the way or—and in some cases only—by sea part of the way and by rail across Europe. These are the Peninsular & Oriental (commonly referred to as the "P. & O."), the Anchor Line, the "City" and "Hall" Lines, the Austrian Lloyd (now temporarily stopped because of the war), the Messageries Maritimes, and the Rubattino. The Natal Line steamers are available for western passages only, the steamers sailing around the Cape of Good Hope on their eastward voyages. There are other services between Calcutta and the West, by steamers sailing around Ceylon, and several of the lines connect Colombo with Europe. Of the latter the Orient, the North German, and the Bibby have been the chief lines besides the Peninsular & Oriental. The Bibby service extends to Rangoon. The new railway between India and Ceylon greatly increases the importance by the Colombo route for southern India. The American & Indian Line operates between New York and the various ports of India.

The time between London and Bombay ranges from 14 to 21 days; from Brindisi to Bombay the time is 11 days; from Marseille or Genoa, 16 days. Excepting so far as sailing programs have been disarranged or entirely suspended by the European war, the following are the principal lines still in operation between Europe and India:

The Peninsular & Oriental Steam Navigation Co.—Steamers run weekly from Bombay and London, leaving Bombay on Saturday and London on Friday. Alternate sailings each way are direct. In other weeks a special steamer runs from Bombay to Aden, where it connects with the Austrian Homeward Mail, and similarly, for the outward voyage, passengers, baggage, and mails are transferred on alternate weeks to a steamer at Aden which proceeds thence direct to Bombay. The Peninsular & Oriental steamers call at Aden, Port Said, Marseille, and Gibraltar. There is ordinarily time for passengers to spend some hours ashore at Port Said and Marseille and a shorter time at Gibraltar. Passengers may travel westward from Port Said by any one of several lines, including special train from Brindisi. Similar arrangements may be made for the eastward voyage. Return tickets between Bombay and Europe are available for two years. First-saloon passengers are allowed 3 hundredweight of personal baggage, 3 of freight; second-saloon passengers and servants, $1\frac{1}{2}$ hundredweight each. Similar provisions apply to the lines indicated below. The British India Steam Navigation Co. has been consolidated with the Peninsular & Oriental.

Anchor Line.—These steamers run between Bombay and Liverpool, ordinarily two steamers each way per month. Westward-bound steamers call at Marseille; other calls, both ways, are at Port Said and Gibraltar. Free tickets by British India Steam Navigation Co.'s

steamers are issued to Karachi passengers to and from Bombay. The voyage to Liverpool occupies approximately 30 days.

Ellerman's "City" and "Hall" Lines.—The City and Hall liners sail westward for the most part from Karachi, via Bombay. Some ships go direct from one port and others direct from the other. They sail to Liverpool twice monthly, and passengers can be booked via Marseille and the overland trains. All the steamers have both first and second class accommodations. Passengers booking in Karachi for steamers sailing for Bombay are given free tickets from Karachi to Bombay by a British India Steam Navigation Co. steamer and are transferred immediately on arrival if the Ellerman liner is sailing the same day.

Recent announcements are made that a new passenger steamer of the Ellerman Line will begin calling at Karachi on regular service to and from England. The ship will also call at Bombay.

Messageries Maritimes.—The steamers of this line sail between Bombay and Marseille, touching at Aden and Port Said, monthly throughout the year. Free passages are granted by British India Steam Navigation Co. boats for Karachi passengers for the voyage between Karachi and Bombay. There are branch lines from Bombay to Colombo and to Pondicherry (in French India), Madras, and Calcutta.

Rubattino.—Monthly sailings from Bombay to Messina, Naples, and Genoa, Messina ordinarily being reached on the 17th day of the month. Austrian Lloyd, Messageries Maritimes, and Rubattino have a joint arrangement by which passengers taking return tickets may travel one way by one line and return by one of the others.

Natal Line.—These steamers make their westward voyages from Bombay to Weymouth usually once a month during the season. Cheap first-class tickets are issued for berths in two, three, and four berth cabins. Steamers give regular through service between South and East African and Chinese and Japanese ports, Singapore, and Penang, via Calcutta.

Bibby Line.—Two or three sailings monthly from Rangoon, via Colombo and Marseille, to Liverpool or London. Free first-class tickets from Tuticorin to Colombo are given to passengers from south India.

Orient Line.—Fortnightly sailings (Australian Mail) on Thursdays from Colombo to Port Said, Naples, Marseille, Plymouth, and London. Concessions for tickets from Tuticorin to Colombo are given to south India passengers.

Other lines in recent service are: Austrian Lloyd, from Trieste the 1st and 16th of each month; Società Nazionale de' Servizi Maritimi, from Genoa the 17th of each month; North German Lloyd, from Southampton every second Tuesday and from Genoa every second Thursday; the Clan Line, from Glasgow to Bombay; the Harrison Line, from Liverpool to Calcutta; the Wilson Line, from Hull; the P. Henderson & Co. Line, from Glasgow to Rangoon; the Hansa Line, from Bremen fortnightly (this line started a direct fortnightly freight service between New York and Bombay); German East Africa Line, fortnightly; Nippon Yusen Kaisha Line, monthly from Yokohama and Hongkong to Bombay and back via Tuticorin and Hongkong, whence there is a fortnightly service to Seattle.

"TRAMP" SHIPS AND COASTING BOATS.¹

It used to be possible to obtain cheap passages, eastward or westward, in cargo or "tramp" steamers. This is now next to impossible, as the steamers are not licensed to carry passengers. Besides the coasting steamers of the British India Co., there are many other coasting vessels. There are also river lines, such as the Rivers Steam Navigation Co., of Calcutta, running on the Brahmaputra, and the Irrawaddy Flotilla Co., in Burma.

Hansa Line.—This German line of ships, now temporarily stopped because of the war, ran ships direct between New York and Bombay and Calcutta for freight only.

American & Indian Line.—This is the only steamship line with direct sailings between New York and Indian ports. It has one sailing every three weeks. The vessels are large, high-class tramp steamers, between 6,000 and 9,000 tons dead weight. All boats touch at Port Said and at least one boat a month calls at Karachi, Bombay, Colombo, Madras, Rangoon, and Calcutta. The average length of the voyage to Bombay is 35 days and to Calcutta 50 days.

Norton, Lilly & Co., Produce Exchange, New York, are the general agents for the American & Indian Line.

¹NOTE.—The largest shipper of freight to India from the United States is the Standard Oil Co. Many ships are sent to India at the convenience of this company with kerosene as principal cargoes, but carrying other merchandise as well. Information as to freight ships sailing is often most reliably obtained from the Standard Oil Co.

COMMERCIAL TRAVELERS.

American firms who contemplate sending commercial travelers to British India may desire to have some approximate idea of the cost of traveling in this country. My inquiries among commercial travelers whom I have met here concerning their ordinary and necessary expenses of travel lead to a summarized general estimate that about \$10 per day is a fair average allowance for India.

The first-class traveling fares by railways in India amount to about 3 cents per mile for distances up to 300 miles and for greater distances about 2 cents per mile. Conditions of travel in India require the use of personal servants, who assume care of luggage, make up one's bed on the train, act as interpreters, and perform other special services such as in the United States would be attended to by train and hotel porters, bell boys, chambermaids, etc. The employment of personal servants in India while on any traveling tours is a peculiar custom of the country, is generally expected everywhere, and the necessity for it soon becomes obvious, as little assistance in the way of servants is ever provided on railways or in hotels. The cost, however, of these personal servants is not very great, and may be considered as a legitimate supplement to the rather low railway fares and rate for hotel accommodation. The wages of the personal servant vary, according to his qualifications, from about 30 to 60 cents per day, while about 10 per cent of such amounts is added as a food allowance. It is also usual to advance about \$3 for clothes for traveling, this being customarily referred to as "warm-clothes money." Also, at the end of his services, a "present," as well as a letter of recommendation, is expected. These servants always travel third class, at the average rate of about one-half cent per mile. There is ordinarily no charge for their lodging at the hotels, when accompanying their masters.

NECESSITIES AND PRIVILEGES ON TRAINS.

More personal luggage has to be carried about in India than would be necessary in the United States, for the light white clothing worn necessitates frequent changes; moreover, much warmer clothing must be provided for evening use and for the colder climate of the hill districts. Every traveler also has to take his own bedding for use on the trains, towels, soap, etc., and if he goes into remote districts where no suitable food or pure water is obtainable he must take his own food and either a supply of water or apparatus for sterilizing such water as can be obtained. In ordinary cases a traveler is permitted to carry free with him in his compartment his bedding, a basket "tiffin" or luncheon, as well as all small articles, including handbags, books, etc. Also he has a free allowance of about 125 pounds for luggage booked through in the van car on his first-class ticket, as well as 30 pounds allowance on his servant's third-class

ticket. All luggage in excess of this is charged for at parcel rates—about 8 cents for each $20\frac{1}{2}$ pounds per 100 miles.

Although important concessions are granted on the railways to Indian Government officials, military officers, missionaries, and theatrical companies, no similar concessions have ever been granted to commercial travelers, except that they are allowed to carry samples, which are not for sale, at half the ordinary parcel rates. This, however, is a rather negligible concession, for when advantage is taken of it the usual free allowance within the limit allowed to all first-class passengers must be given up. To secure such concession on sample trunks it is necessary for the traveler to apply in the name of his firm to each individual railway on which he travels, and such concession is issued only for a period of three months, when it must be renewed. The maximum weight allowed to be booked on such concessions, when traveling by mail trains, is only 410 pounds.

HOTELS AND COST OF FOOD—GRATUITIES.

First-class hotels in India charge about \$2.30 to \$3.40 per day, although in Bombay and Calcutta, as well as in a few other large cities, the charges are higher. In such charges are included meals. Where no hotel accommodation is available, as in most of the small towns, the Government has instituted "dak bungalows" which in many cases afford cleaner and more satisfactory accommodation than the average Indian hotels. The average daily cost at these "dak bungalows" is \$2 to \$2.60 per day. When traveling by train, the average cost of food in the dining cars or station refreshment rooms varies from about \$1.60 to \$2.60 per day.

Servants' gratuities and coolie hire (portage) are an additional expense and depend chiefly on the amount of luggage carried. Usually a large number of coolies assist at such work, each carrying one piece under the direction of the personal servant, but the gratuities expected are very small and usually do not average more than about 30 cents per day. When leaving a hotel after a long stay, a great number of servants usually appear soliciting tips, but their individual expectations are much less than those of servants in American hotels. The distribution of gratuities to such a large number of servants is such an annoyance to travelers that many hotels in India post notices requesting that no tips be paid, but instead whatever sum a traveler cares to pay be placed in a box for subsequent equitable distribution among the servants. If a traveler stops for a week at a hotel about \$1 or \$1.50 is considered a generous donation to the servants' box.

REBATES TO COMMERCIAL TRAVELERS—NECESSARY EXTRAS.

At none of the first-class hotels of India are there any concessions to commercial travelers, but at a few not recognized as first class there is a concession amounting to about 30 cents a day. While meals, except afternoon tea and specially early breakfasts, are included in the ordinary daily rate, yet the hotel bills when rendered are always considerably swelled by certain necessary extras, especially by the bar account for mineral or aerated waters, which in India are a perfectly legitimate and proper expense to be charged up to

firms sending out traveling men, as it is never safe to trust to ordinary drinking water, which is liable to contain the germs of cholera, typhoid, and other diseases. One never can be sure that such water has been previously properly boiled or filtered. Usually, however, at any first-class hotel, aerated soda water, furnished at about 4 cents per bottle, may be considered safe.

There is no necessity for the use of any alcoholic beverages, except perhaps occasionally for chills and other sickness, and, in fact, in this tropical climate the use of alcoholic drinks during the heated hours of the day offers a grave danger to health.

CARRIAGE HIRE—LENGTH OF STAY—ENTERTAINING.

One most important item of cost of travel in India is carriage, or "gharry," hire, and a conservative allowance for this is about \$1.75 per day. The places of business which a commercial traveler is ordinarily obliged to visit are usually so scattered and so remote from his hotel that it is impossible to get about on foot without great loss of time, as well as being considered in India beneath the dignity of a white man. The cities and towns of India do not have their business and hotel districts conveniently and compactly situated as in the United States, and only in the large cities are there tram car lines, and these are patronized almost entirely by the native element.

The length of stay of commercial travelers in different cities and towns of India depends on conditions of trade and the size of the town. In all small towns, such as district headquarters and the average cantonment military stations, a stay of one or two days is usually sufficient. Larger towns may require from three days to one week, while capital cities, such as Bombay, Calcutta, Madras, may require a much longer period. In visiting the Native States, commercial travelers who seek business from Government officials and ruling chiefs and princes are frequently obliged to spend considerable time waiting for interviews at their pleasure, and no specified time can be estimated as to how long it may be necessary to wait to obtain an audience. At most business centers, however, it is possible to transact business with reasonable promptitude. The question of entertainment allowances does not usually loom large in India, as the opportunities for entertainment are limited. If, however, entertainment in such cities as Bombay and Calcutta is considered helpful to business, the general estimate of about \$10 per day for expenses, as already explained, would have to be supplemented accordingly.

TIME FOR VISITS—TAKING ORDERS.

It is usually customary for commercial travelers who visit British India to arrive there about August or September, when climatic conditions begin to be more favorable and customers are not away in the hill stations. They will try to be through with their work about January or February, and then go on to Burma, Straits Settlements, Malay States (including Java and Sumatra), Siam, etc., and then return to India for a "follow-up" visit by the following September. All commercial travelers with whom I have discussed the situation in India agree that very little good is accomplished by merely one visit to this country. It is usually easy to secure trial orders, but unless the country is visited again the business ends with such trial orders.

Moreover, during the first visit a great deal of time is expended in gaining experience and in interviewing people with whom it does not pay to trade, even when orders are readily obtainable. An unusual amount of attention has to be paid in India to the subject of individual credit, and a conscientious commercial traveler who works not merely for his commission but in the true interest of his employer will not adopt the policy of always trying to sell all he can, but will consider the ability and inclination of customers to pay for their purchases. Consequently he will often deliberately limit the size of his orders, on which he receives commissions whether the customer pays or not, and in many cases he will refuse the orders altogether. During the second trip, however, he can go at his work with more definite understanding of the mistakes to be avoided.

ADVERTISING—QUALIFICATIONS FOR SERVICE—CREDITS.

Commercial travelers in India can always be greatly assisted in their work if their employers will embark on a liberal and judicious scheme of advertising. The average native merchant in India rarely exerts himself to go after business, but waits for the business to come to him, and he never takes much interest in goods for which there is not a popular demand. It is therefore necessary not merely to visit the trade by sending out commercial travelers but also to work up the trade by creating the demand through liberal advertising.

Any American commercial house sending out commercial travelers should pay careful attention to their qualifications, both mental and physical, for service in India. A great many commercial travelers who have come out here have made a dismal failure, even when representing lines quite suitable to the country, chiefly because of their lack of tact in dealing with native customers, for whom they often show contempt and prejudice instead of treating them as their equals, at least in the business way. Gentlemanly characteristics are very essential for the commercial traveler in India. He should always show proper consideration and be fair not only with possible customers but also with his competitors, who, at any rate, at the start can teach him much more than he can teach them, notwithstanding all the wide experience he may have had at home.

There are a great many native commercial travelers in India who work for local houses, but in case of English or American houses it always seems best to send out travelers of their own nationality, even though the compensation must be much larger. The native travelers, usually Eurasians, travel second class on the railways and are not paid more than \$75 to \$100 per month, with commissions not over 2½ per cent. European or American travelers are usually paid not only much higher salaries but also larger commissions (from 5 to 10 per cent), as well as being given a bonus on a year's successful business.

Commercial travelers here will always find it a safe policy in case they give credit at all to do so only through banks, with 30 days' time allowance at the outside, except, perhaps, in some exceptional cases. The goods they sell may be shipped from home through sight drafts, documents on payment, or through 30 days' draft, as mentioned.

TRAVELING PRECAUTIONS.

When visiting India commercial travelers should take exceptional care to avoid the serious illnesses prevalent in the country, and it would be specially wise to be vaccinated beforehand not only for smallpox but also for typhoid fever (known locally as "enteric"), the latter disease, together with malaria, being the most serious cause of mortality among Europeans. The chance of getting malaria when traveling in malarious districts may be greatly lessened by taking regular doses of quinine as a prophylactic measure. Plague, while taking off many thousands of the native population every year, seldom attacks Europeans, probably because of their more sanitary environment. Cholera in most instances can be avoided by not drinking ordinary water without boiling, nor eating food which has not been cooked or has been much exposed to flies. The most common sources of trouble to newcomers in India are internal chills, caused by exposure to sudden drafts after becoming overheated. As a precaution most Europeans wear about their waists woolen protections known as "cholera belts."

There is no society or organization of commercial travelers in India. There are no general license or tax requirements for commercial travelers, such as are imposed in some foreign countries, and there are no discriminations in any way in favor of British or native travelers.

SUCCESS OF COMMERCIAL TRAVELERS IN KARACHI.

[By Consul James Oliver Laing, Karachi.]

The repeated statements of American consuls, not only in India but in most other parts of the world, that the United States loses trade by the failure of American shippers to send out qualified agents to cover promising fields, are emphasized by two recent cases in this consular district. An American commercial traveler representing an American house which had exported a certain amount of heavy mill machinery to India for some years called here recently and showed me that he had more than doubled the sale of his firm's goods in less than two years. When it is taken into consideration that single contracts of this house sometimes amount to many thousands of dollars, the advantage is obvious.

The second American commercial traveler was in town only two days. With the assistance of the consulate he got into touch with the leading dealers in his line (canned food products) and with the banks for reference purposes, and sold the dealer a bill of goods including an order for every line and product in his catalogue.

There is no prejudice against American goods here. Travelers for American houses should have had, if possible, some experience in the Orient. All such travelers, whether experienced or not, should not fail to have a talk with the American consul in any city they intend visiting, as conditions exist in India which sometimes are not at all apparent even to an experienced man coming to a city for the first time.

AMERICAN COMMERCIAL TRAVELERS IN MADRAS.

[By Consul José de Olivares, Madras.]

The visits of American commercial travelers to Madras are steadily becoming more frequent and the business transacted by them is prov-

ing, in practically every instance, entirely satisfactory. It would be advantageous if American firms, in mapping out the local route for their representatives, would include, in addition to the city of Madras, the principal west-coast ports and interior cities of the Madras Presidency as places to be visited. A number of the latter localities are developing from hitherto virtually unexploited fields of trade into profitable markets of great promise.

AMERICAN TRADE LITERATURE AND SAMPLES.

The American consulate at Madras has added to its offices a new room to be devoted exclusively to the filing of commercial catalogues and trade literature and the exhibition of samples of American merchandise. The close attention that has been given during the past year to the accumulation and local circulation of American trade literature has resulted in a material increase in imports into this consular district from the United States, and American manufacturers and exporters and publishers of trade journals are urged to keep this office supplied with their most up-to-date catalogues and price lists and with such samples as can be exhibited to advantage within a limited space. Publishers of trade journals are likewise requested to keep the consulate on their mailing lists, as such publications are prominently displayed on reading tables and the information disseminated through the medium of their contents is proving a valuable factor in the campaign in favor of the extension of American trade.

MAKING CALLS.

It is bad etiquette and bad business in India to make calls on mailing days unless unavoidable. In Bombay calls should not be made on Friday or Saturday morning, unless absolutely necessary, but the early part of the week offers favorable opportunities for calling. In other parts of India the mailing days are earlier in the week, according to their respective distances from Bombay, from which the mail steamers leave for Europe. Business offices are not open, as a rule, before 10 a. m., and it is not desirable to make calls before 11 a. m. American visitors sometimes make an unfavorable impression by calling too early in the day.

If an American visitor wishes to cultivate friendly social relations with any business connection in India, he should ascertain if the person is married, and if so, he should arrange to leave calling cards at the latter's private residence, one for himself and one for his wife. Otherwise no matter how well acquainted he may become with such person in a business way he would never receive any invitations to his house or to any purely social function.

If an American traveler or visitor wishes to visit any of the Native States of India, he should make known his intention at the nearest American consulate, so that all necessary formalities can be arranged for his visiting such States.

Letters of introduction are very desirable in traveling in India. When a person comes well introduced he is always received with appropriate courtesy, but if he comes with no introduction he finds it difficult to secure any special attention, either in a business or a social way.

CUSTOMS TARIFF.

INDIA.

The tariff of India is simple and low. All dutiable articles are on the 5 per cent list, with the exception of eight special classes of articles (firearms, military stores, liquors, opium, salt, fish, tobacco, and silver) and two groups, which are at still lower rates, namely: Cotton manufactured goods, $3\frac{1}{2}$ per cent, and iron and steel, 1 per cent. Below are given (1) articles on the 5 per cent list and (2) articles on the free list. These customs duties are imposed under the Indian tariff act of 1894 as amended in 1896. The only export duty is that on rice. The duties are levied for revenue purposes and not for the protection of Indian industries.

For the bulk of the articles chargeable with duty a tariff valuation is fixed, alterations in the valuations being made whenever any sufficiently important changes occur in the market value of the commodities. It is usual to publish a revised list of tariff valuations once a year. This appears in the Gazette of India and is reprinted as a customs circular. The list may be obtained on application to the Secretary, Finance and Commerce Department, Government of India, Delhi.

Special import duties.

Articles.	Rate of duty.
Arms, ammunition, and military stores (firearms and parts thereof):	
1. Firearms other than pistols.....each..	R. a. 50 0 (\$16.67).
2. Barrels for the same, whether single or double.....do..	30 0 (10.00).
3. Pistols.....do..	15 0 (5.00).
4. Barrels for the same, whether single or double.....do..	10 0 (3.33).
5. Springs used for firearms.....do..	8 0 (2.67).
6. Gunstocks, sights, blocks, and rollers.....do..	5 0 (1.67).
7. Revolver breeches, for each cartridge they will carry.....do..	2 8 (0.83).
Ex. 8. Extractors, nippers, heelplates, pins, screws, tangs, bolts, thumb pieces, triggers, trigger guards, hammers, pistols, plates, and all other parts of a firearm not herein otherwise provided for, and all tools used for cleaning or putting together or loading the same.....each..	1 8 (0.50).
9. Machines for making, loading, or closing cartridges.....do..	10 0 (3.33).
10. Machines for capping cartridges.....do..	2 8 (0.83).
<i>Proviso 1.</i> —No duty in excess of 10 per cent ad valorem shall be levied upon any of the articles mentioned in the above list when they are imported in reasonable quantity, for his own private use, by any person lawfully entitled to possess the same.	
<i>Proviso 2.</i> —When any of these articles which have been otherwise imported, and upon which duty has been levied or is leviable, are purchased retail from the importer by a person lawfully entitled as aforesaid, in reasonable quantity, for his own private use, the importer may apply to the customs collector for a refund or remission (as the case may be) of so much of the duty thereon as is in excess of 10 per cent ad valorem; and if such collector is satisfied as to the identity of the articles, and that such importer is in other respects entitled to such refund or remission, he shall grant the same accordingly.	
<i>Exception 1.</i> —Articles falling under the 5th, 6th, 8th, 9th, or 10th head of the above list, when they appertain to a firearm falling under the 1st or 3d head, and are fitted into the same case with such firearms.....	Free.
<i>Exception 2.</i> —Arms forming part of the regular equipment of an officer entitled to wear diplomatic, military, naval, or police uniform.	Free.
Gunpowder, all sorts.....	10 per cent.
All other sorts of arms, ammunition, and military stores.....	0 3 (0.06).
Liquors:	
Ale, beer, and porter.....per imperial gallon or 6-quart bottles..	5 per cent.
Cider and other fermented liquors.....do..	
Spirit which has been rendered effectually and permanently unfit for human consumption.....	• 7 13 (2.60).
Spirit when used in drugs, medicines, or chemicals, per imperial gallon or 6-quart bottles of the strength of London proof.....	

* The duty is to be increased or reduced in proportion as the strength of the spirit exceeds or is less than London proof.

GENERAL DUTY OF 5 PER CENT AD VALOREM.

Food and drink, articles of.—Coffee; fruits and vegetables (except fresh fruits, etc.); mineral and aerated waters and all nonalcoholic beverages; provisions, oilmen's stores, and groceries; spices; sugar, including saccharine produce of all kinds and confectionery (in addition to countervailing duties, if any); tea.

Chemicals, drugs, etc.—Chemical products and preparations (including explosives); drugs, medicines, and narcotics; dyeing and tanning materials.

Metals and manufactures of metals.—Hardware and cutlery, including ironmongery and plated ware, and also including machines, tools, and implements to be worked by manual or animal labor (except as noted in free list); metals, unwrought and wrought, including silver bullion and coin, wire netting, and articles made of metal (except as noted under free list).

Oils.—Oils of all sorts, animal, vegetable, and mineral, including petroleum with flashing point at or above 200° F., for use exclusively for batching of jute or other fiber, for lubricating purposes, or for fuel; paraffin wax.

Other articles.—Apparel, including drapery, haberdashery, and millinery; amber and articles made of amber; art, works of; beads (of all materials except glass and brass); brushes and brooms; building and engineering materials (viz, asphalt, bricks and tiles, cement, fire clay, lime, earthenware piping, etc.); cabinet ware and furniture; candles; canes and rattans and basketwork; carriages and carts, including motor cars, cycles, jinrikishas, bath chairs, perambulators, trucks, etc., and component parts thereof; Chinese and Japanese ware, including lacquered ware; clocks, watches, etc., and parts thereof; coir and articles made thereof; coral, reel; cordage, rope and twine of any vegetable fiber; cork and articles made of cork; earthenware (except piping), china, china clay, porcelain, and imitation or false coral; fans, except common palm leaf, which are free; feathers; fireworks, including fulminating powder; flax and articles made of flax, including linen thread; furniture, tackle, and apparel, not otherwise described, for steam and other vessels; glass, glassware, and false pearls, gums, gum resins, etc., and articles made thereof (including caoutchouc, etc.); hemp and articles made therefrom; hides and skins, except raw or salted, which are free; horn, articles made of, not otherwise described; instruments, apparatus, and appliances, and parts thereof—computing, dental, distilling, diving, drawing, educational, electric, electric lighting, galvanic, measuring, musical, optical, philosophical, phonographic, photographic (including materials for photography), scientific, surgical, surveying, telegraphic, telephonic, typewriters, and all other sorts, except telegraphic instruments and apparatus and parts thereof, when imported by or under the orders of a railway company, and any instruments, apparatus, and appliances when imported as part of personal baggage in the exercise of a profession or calling, which are free; ivory and ivory ware; jewelry and jewels, including manufactures of gold and silver; jute manufactures (except second-hand or used gunny bags, which are free); lac and articles made of lac; leather and articles made of leather, including boots and shoes, harness and saddlery, but excluding belting; matches; mats and matting; oilcloth and floor cloth, including lincrusta, linoleum, and tarpaulins; paints, colors, painters' materials, and compositions for application to leather, wood, and metals; paper, pasteboard, millboard, and cardboard, of all kinds, and articles made thereof; pipes, etc., for consuming narcotics, etc.; perfumery; pitch, tar, and dammar; seeds; shells and cowries, silk and articles made of silk; sizing; soap; stationery; stone and marble, and articles made thereof; straw plaiting and articles made of straw; tallow and grease, including stearin; textile fabrics, not otherwise described; toilet requisites, not otherwise described; toys, toy books, and requisites for all games; umbrellas, parasols, and sunshades of all kinds; walking sticks and sticks for umbrellas, etc.; whips, fishing rods, and lines; wax and articles made of wax; wood and timber, and articles made of wood, not otherwise described; wool, articles made of, including felt; articles not specified in the tariff.

FREE LIST.

Hardware and cutlery.—Only the following are free: Water lifts, sugar mills, oil presses and parts thereof, and any other machines and parts of machines ordinarily used in processes of husbandry or for the preparation for use or for sale of the products of husbandry which the Governor General in council may, by notification in the Gazette of India, exempt; also the following articles used in the manufacture of cotton, viz, bobbins (warping), forks for looms, healds, heald cords, heald knitting needles, laces, lags and needles for dobbies, pickers (buffalo and others), picking bands, picking levers, picking sticks (over and under), reed pliers, reeds, shuttles (for power looms), springs for looms, strappings, weft forks.

Metals and manufactures of metals.—Machinery, namely, prime movers, and component parts thereof, including boilers and component parts thereof; also including

locomotive and portable engines, steam rollers, fire engines, and other machines in which the prime mover is not separable from the operative parts.

Machinery (and component parts thereof), meaning machines or sets of machines to be worked by electric, steam, water, fire, or other power not being manual or animal labor, or which before being brought into use require to be fixed with reference to other moving parts; and including belting of all materials for driving machinery. Provided that the term does not include tools and implements to be worked by manual or animal labor, and provided also that only such articles shall be admitted as component parts of machinery as are indispensable for the working of the machinery, and are, owing to their shape or to other special quality, not adapted for any other purposes. (Note: Machinery and component parts thereof made of substances other than metal are included in this entry. Dynamos, accumulators, motors, and electric fans are treated as machinery.)

Railway material for permanent way and rolling stock, namely, cylinders, girders, and other material for bridges, rails, sleepers, bearing and fish plates, fishbolts, chairs, spikes, crossings, sleeper fastenings, switches, interlocking apparatus, brake gear, couplings and springs, signals, turntables, weigh bridges, engines, tenders, carriages, wagons, traversers, trolleys, trucks, and component parts thereof; also cranes and water cranes, water tanks, and standards, wire, and other material for fencing, when imported by or under the orders of a railway company. Provided, that for the purpose of this exemption "railway" means a line of railway subject to the provisions of the Indian railways act, 1890, and includes a railway constructed in a Native State under the suzerainty of His Majesty, and also such tramways as the Governor General in council may, by notification in the Gazette of India, specifically include therein.

Other articles.—Animals, living (horses, etc.); bamboos, etc.; books, printed, etc.; bristles and fiber for brushes and brooms; coal, coke, and patent fuel; cotton, raw; cotton, twist and yarn; cotton, sewing thread; drugs and narcotics—quinine and other alkaloids of cinchona, tobacco, unmanufactured; earth, common clay and sand; food and drink, articles of—hops, fruits and vegetables, fresh, grain and pulse, not including flour, fish maws, shark fins, singally and sozille; frankincense or olibanum; gold bullion and coin; horn; jute, raw; lead sheets for tea chests; manures of all kinds, including animal bones; oil cake, bran, and cattle food of all kinds; pearl, mother of, nacre; plants and bulbs; precious stones and pearls, unset; printing and lithographic materials, including presses, type, ink, etc., but excluding paper; pulp of wood, straw, rags, paper, etc.; rags; ships and other vessels imported entire or in sections; specimens, natural science, including antique coins and medals; tea chests of metal or wood, entire or in sections; tea-withering racks; wool, raw.

CEYLON.

The customs tariff of June, 1914, contains an extensive free list, a list of articles subject to specific rates, such as wines, spirits, tobacco, and certain other articles, and provides a rate of 5½ per cent ad valorem for goods not specifically mentioned.

Among the most important articles on the free list are the following: Coal, coke, and certain liquid mineral fuel; crude metals, copper and brass sheets and ingots, and bars and structural shapes of iron and steel, other than galvanized; industrial machinery of various kinds; motor boats and steam launches; advertising matter; live animals; hides and skins; frozen meat; fresh fruit; cotton seed and other agricultural seeds; oil from marine animals; machinery and materials for the preparation and packing of tea and coffee.

Specific duties are levied upon wines, spirits, sugar, and tobacco in all forms; firearms and certain ammunition; metals further manufactured than those admitted free; kerosene and other petroleum products except those on the free list; beef and pork, corned or salted; fish, dried or salted; food products which compete with those grown in Ceylon (e. g., tea, coffee, rice); and asphalt.

A few ad valorem rates are named for different articles, as cotton goods (including made-up goods); fireworks, dynamite and ammunition of certain classes, green copperas, and vinegar in cask.

Export duties are provided for arrack, cacao, cardamoms, chanks, cinchona, coffee, tea, rubber, plumbago, and horns of spotted deer and sambur. A royalty is collected on elephants.

MERCHANDISE MARKS.

One of the most serious difficulties connected with export trade to India from countries other than the United Kingdom is the widespread ignorance and misunderstanding of India's laws and regulations relating to merchandise marks. Year after year there occur violations of such legislation, usually quite technical and not deliberate or fraudulent in motive, that result in embarrassing consequences to firms doing business in India, especially to those just starting.

Exporters of goods to India should bear in mind that all goods made or produced beyond the limits of the United Kingdom and British India, in order to obtain entry without fines, delays, and other embarrassments—including their re-marking by customers in India—must arrive in India with the names or trade-marks on them, accompanied by a definite indication of the country of origin, which must be shown in letters as large and conspicuous as any letter in the name or trade-mark, and in the same language and character as the name or trade-mark.

It is generally assumed, under the provisions of the Indian merchandise-mark legislation, that whenever the English language is used, either in trade-marks or in descriptions of imported goods, the country of origin is the United Kingdom. Otherwise there is intent to deceive and violate the law, unless there is a clear counter indication that the goods were manufactured elsewhere. Therefore, in the case of goods manufactured in the United States, the counter indication, "Made in the U. S. A." should appear in clear letters. It is held insufficient to mark simply "U. S. A." If goods from the United States are marked with the name of a city which might also be the name of a city or place in the United Kingdom or British India, the name should be accompanied by further names to indicate that it is in the United States. For instance, Boston in Massachusetts should be accompanied by the name "United States" or by the initials "U. S. A." or by the word "Massachusetts."

FALSE TRADE DESCRIPTIONS.

All counterfeit trade-marks and all false trade descriptions of any sort are strictly forbidden in the case of goods imported into India. The expression "trade-mark" means in India any trade-mark, which, either with or without registration, is protected by law in any British possession or foreign State; and the expression "counterfeit" means a deceptive resemblance, which need not be exact, of one thing to another thing. A false trade description means a trade description which is untrue in a material respect as regards the goods to which it is applied.

Piece goods in India, ordinarily sold by length or by the piece, should have the length in standard yards stamped conspicuously in English numerals on each piece. Piece goods include woolen goods

of all kinds, and the following cotton goods: Cambrics, checks, spots and stripes, chudders, chudder dhooties, dhooties, domestics, doorias, drills, jacconets, jeans, lappets, lawns, lenos, longcloths, madapolams, mulls, muslins, nainsooks, printers, prints, sarries, scarfs (eklai), sheetings, shirtings, tanjibs, twills, T cloths, and Mexicans. Other classes of piece goods are not detained if unstamped. The same applies to unstamped cotton and woolen piece goods imported for the personal use of individuals or private associations, and not for trade purposes. A trade description of length stamped on gray, white, or colored cotton piece goods is not deemed to be false in a material respect, unless where a single length is stamped, the description exceeds actual length by more than 4 inches in pieces stamped as 10 yards long, and 18 inches in pieces stamped as above 47 yards long, provided that the average length of the goods in question does not measure less than the stamped length. Although no trade description of width seems to be necessary, if one appears it is not considered false if it exceeds the actual width by one-half inch in pieces stamped as 40 inches or less in width, or 1 inch in pieces stamped as 50 inches or more in width, provided the average width is not less than the stamped width.

INDICATION OF ORIGIN ON SAME LABEL.

In cases where indication of origin is required to be marked, when the English language is used for goods made outside of the United Kingdom, the counter indication should be adjacent on the same label, or part of the covering of the goods, as the case may be, to which the name, trade-mark, or trade description is applied. It should not be on a separate label, or otherwise detachable from the application of the name, trade-mark, or trade description itself; and it should be applied no less indelibly than the latter. It should be repeated for all applications of the name, trade-mark, or false trade description, except when the latter are reproduced in such close proximity that one prominent counter indication will suffice to cover all. If different languages or characters, English or Indian, are used for the names or included in the trade-marks, the counter indication should be repeated in each language.

Statements, descriptions or numerals, on labels or tickets applied to boxes, cartons, parcels, or other packages, which are manifestly intended only for the purpose of identifying articles for the convenience of dealers and shopkeepers, and are not specially intended to attract the eye of the purchaser, are not treated as trade descriptions; such for instance, as on bundles of hosiery, "Hose, brown merino, size 10;" on shoes, "Enameled leather, men's No. 6;" on hats, "Brown felt, hard, No. 7," so long as such marks or descriptions are not on the goods themselves.

COUNTER INDICATIONS WITH INDIAN TERMS OR SIGNS.

Counter indications are required in connection with words in any Indian language, or letters or numerals in Indian character, or other marks or devices, as representations of Indian deities or emblems which might lead persons to believe that the goods were made or produced in British India, the same principle being thus applied as

to goods made or produced outside the United Kingdom but using the English language in trade-marks and descriptions.

Samples or patterns of goods, which are readily distinguishable as such and valueless in themselves, are not subject to the legal provisions regarding marking of origin.

Although any formal registration of marks, names, or initials is prohibited in Indian customhouses, yet goods are excluded if it should be shown that an attempt has been made to counterfeit some established mark or other indication that is well known to the customs officials.¹ There is at present considerable agitation in India for a law requiring registration for trade-marks, and punishment for counterfeiting registered trade-marks; and it seems likely that there may soon be one to that effect. In regard to dealing with various false descriptions, customs officials are instructed that there should be due consideration given to the provision that a trade description to be false must be "untrue in a material respect." When there are indications that goods are of a certain standard composition, such as the letters B. P. (British Pharmacopœia) in the case of drugs, the description would be regarded as false unless the composition was in accordance with the standard.

WATERMARKED PAPER GOODS.

In regard to certain particular lines of merchandise, like paper goods, there appears to have been considerable confusion among American manufacturers as to the requirements for marking, and not infrequently American consulates in India are requested to furnish explanations as to what the local law really requires. In the case of watermarked paper goods, concerning which there seems to have been a great deal of special misunderstanding and trouble, a leading American commercial traveler in the paper line who has had much experience with the paper trade in India and who is thoroughly conversant with the rulings as regards marking of paper, has, by request, prepared the following statement as to the proper observance of the trade-mark regulations:

According to the Indian law, all papers with watermarks composed of words in the English language are considered as manufactured in Great Britain or in British India. Those imported from other countries are looked upon as having false marks for the purpose of deceiving the trade into considering the goods of British manufacture. Consequently all such watermarked papers as are made in the United States of America should bear in addition to the ordinary watermark the wording "Made in America" or "Made in U. S. A." This indication of origin should be under and distinct from the regular mill watermarks. The letters "U. S. A." alone are not sufficient, as these three letters have no technical meaning in India. The full wording "Made in U. S. A." is necessary in order to leave no doubt as to the country of origin.

In 1912 the customs collectors in India showed considerable leniency and allowed watermarked papers to come into the country without such additional marks as explained above, providing that the reams were stamped "Made in U. S. A.," as they took into consideration that writing paper is generally sold in ream lots or in sealed packages. Last year, however, the law was again put into severe application, as

¹ In the case of the American Tobacco Co. v. Guest, decided in 1892, a case often quoted in the Indian Law Courts, it was held that the proprietor of a trade-mark may obtain an injunction against an innocent consignee of spuriously marked goods, and an order for the spurious marks to be expunged from the goods without having given the defendant any notice before the commencement of the action. The general test of infringement has been held to depend on the question whether or not the marks of the defendant are calculated to cause his goods to be taken by ordinary purchasers for the goods of the plaintiff, as decided in the case of the American Cloth Co. (Ltd.) v. the Leather Cloth Co. (Ltd.) in 1863.

originally, so that to-day any shipment of watermarked paper imported into India in defiance of the law is liable to be seized by the customs authorities.

In shipments of unwatermarked papers, such as cheap printings, it is well to have the wrappers stamped "Made in U. S. A." At any rate, it is always good advertising for the American industry.

"MADE IN U. S. A."

Some American gentlemen's garters imported into Bombay, which have for their name or trade-mark the name of one of the leading cities of Europe, were recently held up at the customhouse at Bombay, and local dealers in the same penalized because the phrase "Made in U. S. A." did not appear on the back of the garter or on the guaranty ticket, although it was stamped once on the cover of the box containing the same. The American consulate at Bombay was requested to ascertain on behalf of the manufacturers of this garter how the law should be interpreted and what additional markings should be necessary. The collector of customs at Bombay, to whom I referred the matter for his official advice in the premises, wrote me:

In accordance with the provisions of the Merchandise Marks Manual, in cases where any indication of origin is required, the general rule is that it must accompany every application of the name, trade-mark, or false description requiring to be qualified. It should be adjacent on the same label or part of the cover of goods, as the case may be, to which the name, trade-mark, or false description is applied; it should not be on a separate label nor otherwise detachable from the application of the name, trade-mark, or false description itself; and it should be applied no less indelibly than the latter.

One of the pieces of metal attached to the sample garter forwarded by you bears the name of a European city unaccompanied by a counter indication of origin. Strictly speaking the garter therefore should be held to infringe the provisions of the merchandise marks act and rules, the goods not having been made in that city. As, however, the indication of origin is legally stamped on the garter no objection would be taken at this port to the importation of garters so marked. I can not, however, say whether other ports in India would pass the mark without objection.

MERCHANDISE MARKS MANUAL—SUGGESTIONS.

The foregoing remarks and explanations will give a general idea of the necessity for marking and describing goods in conformity with the law in India, and the method of so doing, especially to show the country of origin. To American firms who would wish more particular and detailed instructions as to merchandise marking and trade descriptions, a thorough study of the Merchandise Marks Manual, a book officially published under the authority of the Government of India by the Superintendent of Government Printing, at Calcutta, is advised. It can be obtained in India for the price of 8 annas (16 cents). This book reviews the various laws and regulations and contains many special rulings and examples as to their proper application. A copy of the book is on file in the Bureau of Foreign and Domestic Commerce.

It is also suggested that American manufacturers should always be very attentive to the advice and instructions of local agents or importing firms regarding the question of markings and descriptions. Often advice given by local authorities is of more practical value than the perusal of the Merchandise Marks Manual. The reason for this is that while the merchandise marks laws hold good for all of India, including Burma, the interpretation of these laws, especially as regards trade descriptions, is to a large extent dependent on the

individual judgment or ideas of particular collectors of customs at different ports, who sometimes are inclined to be liberal and at other times illiberal. Moreover, with new persons coming into office as collectors of customs, the trend of policy regarding the interpretation of the laws and regulations may often undergo more or less important change. Although the Merchandise Marks Manual is the most important and comprehensive guide for importers and for customs officials in the execution of their duties, in parts it is obscure and ambiguous, leaving much in doubt. The local firms, however, which have had considerable practical experience with more or less intricate questions concerning the marking of merchandise, etc., and with local rulings in these matters, are, generally speaking, better able to convey clear and pointed instructions as to what should be done than the Merchandise Marks Manual itself.

According to Consul James Oliver Laing, at Karachi, American-made sheet metal sometimes arrives in that market incompletely marked as to lengths. A recent shipment arrived marked 70, but with no statement as to whether the 70 was yards, meters, feet, or some mark not necessarily intended as a measure. I was informed by a customhouse official that this causes inconvenience to local officials and merchants. Some of this metal may be handled by middlemen, but it is suggested that when American merchants ship direct, the lengths and other customary measurements be stated specifically.

PICTORIAL TRADE-MARKS.

The purchasers of cotton piece goods in India and Afghanistan depend almost entirely on pictorial trade-marks when they make their selections at local bazaars. Doubtless in many cases the particular attractiveness of these pictures may have quite as much to do with the sale of such goods as the quality of the cloth itself. It is important to have such pictures not only bright in color and generally attractive in design, but of such subjects as will make distinctive impressions on the memory, so that the trade-mark, being well remembered, can be asked for in subsequent purchases.

CHARACTER OF USUAL DESIGNS.

Pictorial trade-marks for cotton piece goods intended for sale among the Hindu population of India usually have as their subjects instances in Hindu mythology, Hindu romantic drama, temples, deities, nautch girls, etc., and occasionally such pictures are shown as of the King-Emperor of India and European actresses.

For the Mohammedan population of northern India and of Afghanistan, trade-mark pictures seem to deal chiefly with such subjects as Mohammedan rulers or princes, such as the Ameer of Afghanistan, the Nizam of Hyderabad, and the Sultan of Turkey, who is the head of the Mohammedan religion; also there are pictures of Mohammedan mosques, views from Mecca, Medina, Constantinople, etc., and representations of scenes in war, in which Mohammedan soldiers are depicted as vanquishing their Christian enemies. Pictures of beautiful women of all nationalities, as well as local beauties and dancing girls, seem to appeal to both the Hindu and Mohammedan tastes.

SOME POPULAR LINES.

On the Afghan border, at New Chaman in Baluchistan, I found that a particular line of English long cloth which seemed to have the largest sale among Afghans had attached a trade-mark picture showing the Ameer of Afghanistan on horseback; another line had a picture of the Crown Prince of Afghanistan. Another interesting trade-mark noticed there contained a picture of the famous Kohat railway tunnel ($2\frac{1}{2}$ miles long) on the Baluchistan railway near New Chaman. Other popular pictures were found to include Sepoy cavalry, men wrestling, tiger hunting, and various native animals.

Most of the trade-mark pictures have apparently been printed in England or Germany from pictures purchased in India by the travelling representatives of cotton piece-goods firms. I have not as yet been able to find in any of the native bazaars any American trade-mark pictures. I would suggest, however, that the use of such trade-mark pictures should be an essential feature of American cotton piece goods intended for export to India or Afghanistan. As required under the Indian trade-mark law, they should have printed on them, "Made in the U. S. A." or "United States." The name of the city where the cloth is made is not sufficient. On the cloth itself should be stamped the length and other information required under the Indian merchandise marks act. The trade-mark pictures contain in native languages the name of the maker and country from which imported and sometimes an English translation.

SUGGESTED AMERICAN SUBJECTS—NATIVE LANGUAGES.

I would suggest that American manufacturers of cotton piece goods might, in preparing their trade-marks for the Indian market, make use either of such native subjects as already mentioned or else of some American subjects which might strike the native fancy, as being particularly novel or interesting, such, perhaps, as Niagara Falls, the Statue of Liberty at New York, some typical New York skyscrapers, the Capitol at Washington, or some such view as that of a carriage driving through one of the big trees of the Mariposa group in California. Such trade-mark pictures, after being taken off the cotton cloth, are seldom thrown away, but are usually pasted on the walls of native shops or houses, where they serve as a permanent decoration; also as an advertisement of the particular line of cotton piece goods to which they had been attached.

The native languages in which trade-marks are usually printed include Urdu or Hindustani (in Persian characters), the language of Indians in the northwestern and central parts of the country, and spoken and understood almost throughout India; the same language in Hindi characters for Hindus of the Punjab and the Northwest Frontier Province; the same language in Nagri characters for Hindus of the United Provinces of Agra and Oudh and part of the Punjab; the Gujrati language (in Gujrati characters) for the Bombay Presidency; Bengali language (in Bengali characters) for Bengal; the Tamil language (in Tamil characters) for southern India; the Urdu language (in Persian characters) for Kashmir; and the Pushtu language (in Pushtu characters) for Afghanistan, or in Persian if intended for the upper classes, the court language being Persian.

PATENT APPLICATIONS.

Owing to the frequent imitation of foreign goods in India, it would be advisable for American manufacturers who hope to sell here many devices easily susceptible of imitation to take out patents in this country. It is not at all uncommon for Indian native dealers to order from other countries a particular article or machine, not with the expectation of importing it in the future, but merely to study it and locally manufacture copies of same.

There is a well-known American rice huller on the Indian market. It is stated that some Indian dealers have found that it is cheaper to buy spare parts of this machine and assemble them than it is to buy the machine already put together in the United States.

NOTICES FOR THE GUIDANCE OF INVENTORS.

The Bombay Government Gazette has recently published some general notices for the guidance of inventors who may desire to secure patents in India. These notices as issued from the Indian patent office, No. 1 Council House Street, Calcutta, are as follows:

All communications relating to the application for patents and for registration of designs under the Indian patents and designs act (11 of 1911) or in continuation of applications under the inventions and designs act (V of 1888) should be addressed to the "Controller of Patents and Designs, 1 Council House Street, Calcutta." Documents sent by post should be carefully packed.

Directions for the guidance of inventors and others are given in the Indian patents and designs act, 1911 (price 20 cents), and in the Indian patents and designs rules, 1912 (price 4 cents). These should be consulted before an application is made to the controller.

The patent office can not undertake (1) to give opinions on the interpretation of patent law, or on the advisability of protecting inventions and designs, or on their infringement; (2) to make searches in respect of information available in the public room; (3) to recommend any particular agent; or (4) to assist in the disposal of inventions. Applicants are warned that the Indian patents and designs act, 1911, is in force in British India only, and patents granted under it do not extend to the United Kingdom or any of the British possessions. The International Convention for the Protection of Industrial Property does not include India. Applications for patents in countries other than India should be made to the patent offices in the countries concerned.

FEES—TRADE-MARKS—SPECIFICATIONS.

Fees are payable in cash and must be received in the patent office within the time allowed by the acts. When checks are offered in payment of fees, it must be clearly understood that the office can not hold itself responsible for any delay that may occur in the collection of cash on the checks; any check not payable in Calcutta is subject to commission. In cases where it is not possible to have the fees handed in at the patent office, it is preferable to send them by money order or postal order, payable at Calcutta, to the Controller of Patents and Designs, and to advise him that they have been sent. Stamps will not be received in payment of fees.

Trade and property marks are not registered, and medicines are not patentable under the Indian patents and designs act. There is no provision of law in British India for their registration.

Printed specifications of applications which have been accepted are published within about three weeks after acceptance has been notified in the Gazette of India. These specifications can be purchased at the patent office at a uniform price of 16 cents per copy and may be seen free of charge, together with other publications of the patent office.

Specifications of inventions which have been notified in the Gazette of India as filed under the provisions of the inventions and designs act (V of 1888) are not printed, but copies may be inspected on payment of a fee of 32 cents, at the Patent Office, 1 Council House Street, Calcutta; the Record Office, Egmore, Madras; the Record Office, Bombay; the Office of the Revenue Secretary to the Government, Rangoon; and the Office of the Director of Industries, United Provinces, Cawnpore.

PRESERVATION OF MERCHANTISE FOR TROPICS.

[By Consul Edward J. Norton, Bombay, India.]

One of the earliest experiences of most exporters who send goods to tropical countries is an unexpected loss which is traceable to the influence of a climate with which they are not familiar. The effect of the climate must be considered apart from all other risks due to accidents or violence, and they may be summed up under the heads of heat, damp, and vermin. Moisture as existing in the air of Bombay is very favorable to the growth of mildew in leather, paper, or manufactured goods. It quickly tarnishes metals and renders cooked foods unfit for consumption in a few hours.

Many industries are completely stopped in India during the wet weather, mainly on account of the lack of proper appliances for drying. Tile making, for example, is always stopped during the monsoon, and the cigar industry seems to have failed in Bombay largely through the absence of proper drying apparatus for absorbing the moisture that had been imparted to the leaf and rendering it adaptable to machine manipulation.

DATA FOR SAFEGUARDING MERCHANTISE.

In a pamphlet published by the Indian Textile Journal of Bombay the following is stated regarding the effects of the Indian climate on different manufactured articles:

The rainfall in India, which all takes place within four to five months, contributes largely in giving to the climate its peculiar character. Averages at various cities follow: Bombay, 72.25 inches; Karachi, 7.34 inches; Hyderabad (Sind), 8 inches; Nagpore, 45.09 inches; Allahabad, 38.51 inches.

The effect of heavy and continuous rain in the Tropics is to produce a dampness in the air quite unknown in Europe, and which is very destructive to many articles of European manufacture. The moisture and heat combined set up all kinds of fungoid growth and decay in goods, which are quite unaffected by the climatic conditions of Europe. Mildew attacks textile goods, leather, books and stationery; arms, cutlery, and metal work require constant supervision to preserve them. European furniture of wood is soon spoiled by swelling and shrinkage, or by borer worms; and liquors, excepting the strong alcoholic ones, rapidly deteriorate in the heat of India. Perishable goods soldered up in tin-lined cases are not safe if they have been packed in Europe in wet weather. The heat of the ship's hold in the Red Sea, or that of a closed iron wagon on the Indian railways, when the iron may acquire a temperature of 160 degrees in the sun, will start mildew in the case by the aid of the moisture within it. Straw and shaving packings hold a good deal of moisture in damp weather, and do much mischief when sent to the Tropics. No merchandise, therefore, that is liable to injury from heat or moisture can be stored long in India without serious deterioration.

BOOKS.

Books if bound with ordinary paste are quickly attacked by mildew and by vermin. Beetles will eat off the surface finish from stamped cloth covers. The paste should be mixed with corrosive sublimate or other antiseptic. Books on shelves, unless packed tight, are all hanging by the binding, and a warm, damp atmosphere loosens them from the covers if they are large. All large books for use in the Tropics should be bound so that when placed upright on a shelf the leaves should rest on the shelf—that is to say, the covers should be cut flush with the leaves on the under side. The appearance of such a volume might provoke criticism, but it would never lose its cover in the manner described. Books sewn with wire go speedily to pieces in

the Tropics. Since wire sewing has been introduced, a very foolish economy has substituted tinned iron wire for tinned copper. The tinning soon disappears from the iron and the book soon falls to pieces.

OILS AND DRUGS.

Barrels containing oil are very quickly affected by a hot and dry atmosphere. The moisture from the wood is evaporated more quickly than the oil can replace it and leakage begins, unless the hoops are set up. Oil, therefore, can be safely stored only in iron tanks. Drug compounds and proprietary medicines are also specially affected in the Tropics. Pills lose in time their capacity to dissolve, and gum capsules, by oxidation, become practically waterproof in spite of every possible care having been taken of them.

MANUFACTURES OF STEEL OR IRON.

Steel or iron instruments or weapons meant for use in the Tropics should be kept in cases without any linings. Velvet, silk, plush, cloth, or leather linings all absorb moisture and cause the instrument to rust. Nothing will keep them so well as linings of baywood or other absorbent timber which has been well painted, while hot, with a melted parafin wax. No wax need remain on the surface, but if the pores are properly filled the trouble and loss due to rusting of valuable instruments or weapons may be avoided. During the monsoon rains all wooden cases containing merchandise for transport must be covered with pack sheeting and tarred unless they are tin lined.

THE PROCESS OF DRYING MERCHANTISE.

The process of drying merchandise, whether it be textile goods or other materials demands special arrangements during the rains that may fall for weeks together with very little intermission, and the storage of dried and other goods such as tobacco or provisions, has still to be provided for. It may not improbably be found in connection with the ice factories that are becoming common in India, and which by means of suitable extension, might provide cool storage, as is already done in New York. A sufficient reduction of temperature stops the action of moisture even on the most perishable goods. This may be observed in the case of fish and meat, which in Bombay are tainted in a few hours after death. In cold weather in Europe they will keep for several days, and if well frozen they may be preserved indefinitely.

USE OF ABSORBENTS AND REPELLENTS—TIGHT CASES.

Much has already been done for the preservation of perishable goods on a small scale, and the use of absorbents in air-tight cases is a great aid in the preservation of sample, used in commerce. Lime, chloride of calcium, salt, dried sawdust, and sulphuric acid have their uses as absorbents of moisture, and should all be known and understood in a well-arranged sample room.

Glass showcases should have a floor as well as top and sides of glass, for a wooden floor, being permeable to moisture, will absorb water vapor from the air and transmit it to the atmosphere of the case. There is thus a flow of moisture through the wood which must either be taken up by absorbents or left to deteriorate the contents of the case. No showcase is absolutely tight, unless it be a bottle with the stopper cemented in place. There is therefore a circulation of air in and out, which is controlled by and due to the fluctuation of barometric pressure twice in every 24 hours. Every closed vessel breathes twice a day, the inflow carrying with it dust and moisture. The dust settles in the still air of the case and the moisture is taken up, partly by the absorbent and partly by the articles within. It is in this fluctuation of air pressure that gives movement to the aneroid barometer. Camphor has for a long time been used to repel the attacks of vermin upon furs and textile fabrics, but it is now being abandoned in favor of naphthalene and benzine, whose odor is particularly repugnant to insects of all kinds. Kerosene is also much disliked by them, but being much less volatile its use is limited. Ants will not crawl up the leg of a table or bed around which a rag dipped in kerosene has been tied, and suspended meat safes may be protected in the same way, with a rag tied around the suspending cord.

ADVANTAGE TAKEN OF DRY SEASON.

Machinery, especially that for textile factories, is imported during the dry season. If it has to be conveyed far from the port of discharge, the makers should be carefully informed regarding the kind of land carriage that will be employed to deliver it. If there is much transport by road, as may easily happen, the quality of the road, the inclines, bridges, and fords should all be carefully examined and reported on, as it might be necessary to restrict the maximum weight of the heaviest article to meet the peculiarities of transport.

METHOD OF PURCHASING GOVERNMENT STORES.

The Department of Commerce and Industry of the Government of India announced through the Indian Trade Journal a resolution of the Government dated July 24, 1913, establishing rules for the purchase of supplies required for this Government from time to time and superseding previous rules governing such purchases.

The resolution provided that all articles which are produced in India in the form of raw material, or are manufactured in India from materials produced in India, should, by preference, be purchased locally, provided that the quality is sufficiently good for the purpose and the price not unfavorable.

DOMESTIC PREFERENTIAL STIPULATIONS.

All articles manufactured in India from imported materials should, by preference, be purchased in India, subject, however, to the following conditions:

(a) That a substantial part of the process of manufacture of the articles purchased has been performed in India; (b) that the price is as low as that at which articles of similar quality can be obtained through the India Office; (c) that the materials employed are subjected to such inspection and tests as may be prescribed by the Government of India.

NOTE.—The term "a substantial part of the process of manufacture" in clause (a) means that a substantial part of the preparation of the finished article must be performed in India, whether from raw materials or from component parts obtained in a finished state from other sources.

Articles which are not manufactured in India should be obtained by indent upon the Store Department of the India Office, except in the following cases:

(a) When the articles are already in India at the time of order and their price and quality are not unfavorable as compared with those at which similar articles could be obtained through the India Office; (b) in the case of important construction works let out on contract, articles not manufactured in India required for construction of such works may be supplied by the contracting firm, subject to the following conditions: (1) That the firm is approved by the Government of India and is included in the list of firms so approved; (2) that the materials are subject to the current specifications and tests prescribed by the Government of India.

NOTE.—Articles of clothing and equipment of European manufacture required for the Burma Police Department may be procured for the present without the intervention of the India Office.

PURCHASES IN INDIA.

The following articles, whether manufactured or produced in India or not, should be purchased in India, provided that they comply with the current specifications, are of the requisite quality, and can be obtained at a not unfavorable price:

(a) Those of a perishable nature; (b) explosives; (c) block tin; (d) wines and spirits and English bottled beer for the use of Government hospitals in India; (e)

kerosene; (*f*) plant and materials for electric installations intended to take current from existing centers, and small electrical power and lighting plants of not more than 25 kilowatt capacity, which involve the provision of generators and cables for distribution, provided they comply with the current specifications and tests prescribed by the Store Department of the India Office; (*g*) Australian timber; (*h*) Australian copper; (*i*) Italian marble; (*j*) British Columbian timber; (*k*) plant and materials for small gas installations the cost of which does not exceed \$5,000; (*l*) such other classes of articles as may from time to time be prescribed by the Government of India. All such cases should be reported to the Secretary of State for his information.

When serious inconvenience to the public service would be caused by waiting to obtain an article from England through the Director General of Stores, or when, owing to the greater promptitude of supply, an economy can be effected by purchasing in India articles which, under the foregoing rules, should be obtained through the Store Department, the purchase may be made in India, provided that the articles are already in India at the time of order, but in such cases, if the value of the articles exceeds \$250, the sanctioning officer should place on record the reasons which make the local purchase desirable. This record shall be available for the inspection of the examiner of accounts or the supervising officer when required.

Nothing in the rules is to be deemed to prohibit the purchase of stores of European manufacture by one department or railway from another.

INDENT PROCEDURE.

All articles which under the foregoing rules are not to be bought in India should be obtained by indent on the Store Department of the India Office, except any which the Secretary of State may have specially authorized the Government of India or its officers to purchase direct outside India. Such purchase is at present permissible in the case of the following articles:

(1) Seeds; (2) cinchona bark; (3) articles for experimental or research purposes required by officers approved by the Government of India from time to time; (4) excise instruments and apparatus required by provincial excise departments for experimental or research purposes; (5) china, glass, cutlery, plate, crockery, and perishable fabrics, including linen, for residences which are furnished by Government; (6) Australian timber; (7) Australian lead; (8) such articles as superintendents of vaccine depots may require for the preparation of vaccine lymph (e. g., lanolin and glycerin); (9) chemicals and scientific apparatus of small value required by Government schools and colleges, which do not require careful inspection and testing; (10) articles required for viceregal residences in special and urgent cases.

NOTE.—Payments for stores purchased under this rule should be made direct to the suppliers by the purchasing officers.

All requirements should be fulfilled locally, provided that quality and price are not unfavorable and provided that such purchase does not violate any of the instructions contained in these rules. In cases, however, in which stores have to be obtained through the India Office, every effort should be made to foresee requirements so that the indents may be dispatched in ample time.

In obtaining stores from England it may be assumed that the time required from the transmission of an indent upon the Secretary of State to the receipt of the stores is in the case of: Urgent telegraphic indents, not less than 3 months; ordinary indents, 6 to 10 months, according to the article demanded; for special stores, e. g., large girders, rolling stock, etc., up to one year in ordinary times.

COMPARISON OF PRICES.

In all cases in which the selection of source of supply depends upon comparison of prices, the procedure to be adopted for such a comparison is as follows:

(1) A reference should be made to home prices together with allowance of \$3.20 per 100 pounds for interest, 52 cents per 100 pounds for insurance, and 6 cents per ton for freight brokerage; (2) in cases of important contracts, the prices ruling in the English market should be ascertained by telegraphic reference to the Director General of Stores; (3) in cases where the necessary information as to home prices is not available from the rate lists, the purchase in India shall be subject to the condition that the price is not unfavorable; (4) in order to arrive at the market value at an Indian port of the article imported from England the following charges shall be included: (a) Landing, wharfage, and port charges as shown in the rate lists, (b) customs duty, as shown in the tariff to be applicable to the article in question, to be calculated on its cost plus the additional charges mentioned in the earlier part of this rule; (5) the cost of carriage to site from port or place of manufacture, as the case may be, shall be taken into account.

Any articles purchased in India which should be tested are liable to the specifications laid down from time to time by competent authority, with the approval of the Secretary of State in council, and should be required to pass the tests prescribed for such articles.

IRON AND STEEL WORK—DIRECT PURCHASE PRIVILEGE.

Important iron and steel work, if purchased in India, should only be obtained from firms approved by the local government or administration and entered in a schedule as corrected from time to time by the Government of India.

NOTE.—By "important iron or steel work" are meant articles of iron or steel which form important components of the project in hand, e. g., bridge girders and roof trusses, built up in the firm's workshops and supplied, ready for erection, in such sections as may be convenient, and rolled-steel beams, rails, or other sections cut to length or otherwise prepared at the firm's workshops to suit the indenting officer's requirements. The intention of the rule is to insure that parts, the accurate preparation of which is essential to the security of a project, shall be obtained only from firms which possess workshops and appliances capable of turning out work of the desired standard. The raw materials used may be either imported or of Indian manufacture, subject to the usual specifications.

The Government of India has power to sanction departure from the rules in cases in which such departure is absolutely unavoidable, subject to a report to the Secretary of State if the expenditure exceeds \$3,300.

The list of officers who are authorized to obtain direct from manufacturers or dealers in England, America, Japan, or other foreign countries such articles as they may require for experimental or research purposes include:

Superintendent X-ray Institute; chemical examiners; superintendents of vaccine depots; principals of medical colleges; superintendents of medical schools; directors of bacteriological, pathological, or research laboratories, including officers in charge of divisional and brigade laboratories; principals of arts colleges; principals of technical and industrial institutes; directors of industries; directors of fisheries; sanitary commissioners; director, Madras cinchona department; principals of training colleges; principals of veterinary colleges; officer in charge of the experimental sewage installation at Poonah; surveyor general of India; inspector general of forests; director general of observatories; director of botanical survey; agricultural adviser to the Government of India, and director Agricultural Research Institute, Pusa; imperial bacteriologist civil veterinary department; imperial agricultural chemist; imperial mycologist.

gist; imperial entomologist; directors of agriculture; president of the Imperial Forest Research Institute; principal of the Imperial Forest College; director Geological Survey of India; Railway Board; directors of public instruction.

The following are the firms from which iron and steel may be bought in India:

Calcutta.—The Bengal Iron & Steel Co. (Ltd.), Barakar; the Vulcan Iron Works (Ltd.), Burn & Co., Jessop & Co., John King & Co., Ahmety & Co., Martin & Co., Heatley & Gresham (Ltd.), A. and J. Main & Co., the Shalimar Works (Ltd.), T. E. Thomson & Co., W. Leslie & Co., and Balmer Lawrie & Co.

Bombay.—G. Gahagan & Co., Richardson & Cruddas, Alcock, Ashdown & Co., Garlick & Co., Marsland, Price & Co., and Sorabji Shapurji & Co.

Karachi.—Cosser & Co., Mackenzie & Co., B. R. Herman & Co., and the Engineering Co.

Madras.—Massey & Co., Oakes & Co., Arbuthnott Industrial (Ltd.), the Reliance Foundry, and Mansfield & Sons.

Burma.—The Irrawaddy Flotilla Co. (Ltd.), Bullock Bros. & Co. (Ltd.), the Dunnedaw Engineering Works, Howarth Erskine (Ltd.), and the Burma Engineering & Trading Co. (Ltd.).

United Provinces.—Crowley & Co., Allahabad; the Empire Engineering Co. (Ltd.), Cawnpore, and the Lucknow Iron Works.

The Punjab.—N. D. Hari Ram & Bros., Rawalpindi.

Bihar and Orissa.—Arthur Butler & Co., Mozaifpur, and the Tata Iron & Steel Co. (Ltd.), Sakchi.

HOW AMERICAN FIRMS MAY COMPETE.

It will be noticed from the above that most important supplies, except electrical equipment, gas plants, and kerosene, must be purchased either in India or in England, in accordance with the rules as above laid down, and that the Government officers who are authorized to make direct purchases from other countries are, with the exception of the Railway Board, not those whose requirements would be likely to involve large expenditures of money. In the case, therefore, of American manufacturers desiring to do business with the various departments of the Government of India and the various local governments bound by the instructions of the Imperial Government, it would seem best to keep in touch both with the Store Department of the India Office at London and with English firms selling goods to the Store Department at London and with firms in India with whom the various departments of the Government of India are permitted to do business. American firms might, however, by submitting catalogues and other information to various heads of and advisers to Government departments in India not permitted themselves to purchase direct in the United States, induce them to make recommendations or requisitions for certain special articles they might desire as specially meeting their requirements, which could then be purchased either through the Store Department of the India Office at London or through local firms in India.

PREFERENCES TO FIRMS IN INDIA.

The new regulations as compared with those previously existing will give greater latitude and opportunity for local India firms to do business with the Government. These firms have long had outstanding a complaint that unfair preference was given to goods imported from England and that they were not favored with Government patronage except in case of urgency when there was not time to import goods needed from England. In accordance with the present

regulation, that the purchase may be made in India when articles are already in India at the time of order and their price and quality are not unfavorable as compared with the cost of obtaining them through the India Office at London, local firms in India will now be encouraged to carry larger stocks in order to be ready for any such orders as may be forthcoming. This will really contribute to the India Government's own convenience, as, with a larger assortment of local stocks to purchase from, a great deal of time may be saved in not having to wait to obtain such goods from England. If local firms happen to be well stocked with American goods at the time of a Government order, these very likely could be successfully disposed of to the Government.

PURCHASES BY NATIVE STATES.

The foregoing rules apply to the Imperial Government of India, and provincial governments under direct British rule are also bound by them, but not the Native States of India, which may adopt whatever regulations they think fit, the British Government only exercising oversight to the extent of refusing to permit any unwarrantable extravagances or expenditures beyond the financial ability of such States to assume. Native States as a rule afford more opportunity for business purchases from the United States for Government purposes than do the Provinces under direct British rule.

GOVERNMENTAL ASSISTANCE TO TRADE.

VARIED ACTIVITIES OF INDIAN POST OFFICE.

The Post Office Department of India is an especially important factor in the economic and commercial development of the country. Besides transmitting letters and parcels and conducting telegraphs and telephones, the Post Office is considered the best medium for collecting money for articles sold on the value-payable system. Its postal savings banks, which on March 31, 1914, had 1,638,725 active accounts, are thought by a large number of people to offer a method of saving as safe as the previously prevailing practice of hoarding or burying in the ground, if not safer. The Indian Post Office Department also maintains a life insurance branch, which, on March 31, 1914, had 24,574 active postal life insurance policies with an aggregate insurance of \$10,950,000. This department also looks after the disbursement of pensions to native military pensioners. One of its most beneficial functions is the sale of quinine to the public, 12,059 pounds having been sold in malarious districts during the year.

POSTAL BUSINESS WITH UNITED STATES.

In reply to an inquiry concerning the postal business between India and the United States, Mr. W. Maxwell, Director General of Posts and Telegraphs, wrote from Simla:

I regret that we have no data on which to estimate the number of postal articles dispatched to India from the United States, and statistics of the number of parcels and money orders sent from India to that country are not maintained. The number of letters, post cards, newspapers, etc., sent from India to the United States of America during the year ended March 31, 1913, is estimated to have been: Letters, 430,000; post cards, 84,409; other articles (newspapers, book packets, and samples), 554,255.

Delay in receiving American goods, owing to the lack of parcel-post service from the United States to India, is a serious handicap to trade and results in the placing of orders in England. Local merchants desiring American samples before placing large orders are confronted with the fact that they can not hope to do any business without waiting an unreasonably long time. One American firm dealing in carbon papers, which desires to build up a mail-order business in India, considers it necessary to establish an agency in London.

The Director General of Posts and Telegraphs of the India Government, states that the India Government would welcome a parcel-post service from the United States, which is the only important nation by which such service is not now maintained. India has for the last five years or more had a regular parcel-post service to the United States.

The shortest time occupied in the transit of the mail from London to Bombay was 13 days, 6 hours, and 49 minutes, while the average time for the year was 13 days, 8 hours, and 34 minutes. In the opposite direction the quickest transit was 12 days, 21 hours, and 56

minutes, the average time for the year being 13 days, 10 hours, and 5 minutes. The approximate time of mail service between Bombay and New York via London is 3 weeks.

LAST YEAR'S BUSINESS.

The Annual Report on the Post and Telegraphs of India for the year 1913-14 shows that the total number of postal articles of all kinds, excluding money orders, transmitted during the year was estimated at 1,050,000,000, being 35,000,000 more than in the preceding year. It was estimated that the total number of letters, post cards, and packets sent and received by the foreign post was 69,000,000, as compared with 64,000,000 in 1912-13. Of the total, 43,000,000 were exchanged with the United Kingdom, India receiving 28,000,000 from that country and sending to it 15,000,000. In the case of other countries, the receipts, 12,000,000, were more than balanced by the dispatches, 13,000,000. In particular classes of articles a striking difference occurs between the number of newspapers and book and sample packets coming into and leaving India, the approximate figures being 19,000,000 and 7,000,000, respectively. Of the 19,000,000 received, 14,000,000 came from the United Kingdom, while of the 7,000,000 dispatched, 2,000,000 were for that country. The total number of foreign parcels sent and received rose from 889,781 to 994,921, of which more than one-half were exchanged with the United Kingdom.

Stamp booklets, which were introduced in 1907, are becoming increasingly popular, the total number sold having risen from 1,884,781 in 1911-12 to 2,438,160 in 1913-14.

Motor mail services were introduced in Hyderabad and Ootacamund, and the question of replacing horse vans by motor vehicles, for the conveyance of mails in the larger cities generally, is under consideration.

THE VALUE-PAYABLE POSTAL SYSTEM.

The "value-payable system" gives immense assistance to trade within this Empire by meeting the requirements of persons who wish to pay for articles sent to them at the time of receipt of the articles or of the bills or railway receipts relating to them, and also of traders and others who wish to recover, through the agency of the post office, the value of articles supplied by them.

This feature of India's postal system meets a peculiarly great necessity of local trade in India, a country where knowledge of individual conditions of credit is particularly vague and unsatisfactory. By this system merchants in Bombay, Calcutta, Madras, and other leading commercial centers of India can fill orders for any part of India without knowing anything about the personal credit of those ordering goods, but with a reasonable certainty that the goods will be paid for on delivery, or at any rate, in case payment should not be met, that the goods would at least be returned to them, so that there would be no loss. The important extent to which this system is utilized by merchants in India is shown by statistics of value-payable articles of all kinds sent through the post in India during the fiscal year 1913-14, which amounted to the large total of 9,572,023.

OPPOSITION TO EXTENSION OF THE PRIVILEGE.

An effort has been made by commercial interests in England to get the value-payable system of India extended so that articles sent from England might come within its convenient provisions. This, however, has been resisted by local merchants in India, who feel that they would lose an immense amount of trade if the sending of parcels from England or any other country should be so greatly facilitated. At present articles can be sent from England to India by parcel post if they do not exceed 11 pounds in weight, or do not contain articles prohibited from importation into India, but this parcel-post arrangement includes no means for collecting the value of the goods on delivery. English merchants, therefore, when they fill orders from persons or firms unknown to them who have not paid in advance, are obliged to make use of banking facilities, through documents against acceptance or documents against payment. As banks doing business in India make considerable profits through exchange facilities offered, they are naturally opposed, as well as the local merchants of India, to an extension of the value-payable system of India to other countries.

OVERCOMING AMERICAN DISADVANTAGES.

In sending goods from the United States to India not even a parcel-post system is available, as from England to India, and this naturally is a severe handicap to American trade interests. One American manufacturing firm has recently written to me intimating that it contemplated establishing a London distributing branch, owing to the advantages of the English parcel post in getting packages through to India with much less loss of time, trouble, and expense than in sending them direct from the United States. It would, however, seem still better for American firms expecting to do a large business in India in small articles which could be conveniently posted, and especially with such persons or firms whose credit is unknown to them, to arrange their distributing branches in India itself, as in this case the convenience and safety of the local value-payable system would be important factors in their favor.

METHODS OF PROCEDURE.

In sending value-payable articles through the post in India the sender of such goods in parcels or book packets may at the time of posting state the value of the contents, with a view to the amount being realized from the addressee and paid to the sender. Payment can be made by money orders. Postage will be chargeable on value-payable parcels and book packets at the same rates as are chargeable on ordinary parcels and book packets. Prepayment of parcel postage can only be made in stamps affixed to the parcel. Value-payable unregistered book packets will be delivered at the door of the addressee and the money will be collected by the postman.

Delivery of value-payable parcels and value-payable registered articles the value of which exceeds \$8.33 must, however, be made at the post office. The value-payable system is extended to Ceylon,

Singapore, and the Straits Settlements. Firms which post value-payable articles in large numbers can also avail themselves of the advantages of a special procedure under which they will assign, in special journals which will be supplied to them, their own numbers to the value-payable articles posted by them, and will thus have no difficulty in tracing each article in payment of which a money order is received.

An article may be sent by the value-payable post in India even though it possesses no intrinsic value. Thus, legal documents, bonds, policies of insurance, promissory notes, railway goods and parcel receipts, bills of lading, or ordinary bills for collection may be sent as value-payable postal articles. In the case of a railway receipt or bill of lading sent as a value-payable postal article, it will be sufficient if the articles to which the railway receipt or bill of lading relates have been sent in execution of a bona fide order. In the case of the other documents specified the document must be sent in execution of a bona fide order to send the document itself.

A COLLECTION AGENCY FOR FREIGHT SHIPMENTS.

The most important feature of the value-payable system in India is that whereby railway receipts and bills of lading are included within its provisions. This makes it possible to secure the advantages of the value-payable system in the shipment of goods of far greater bulk or value than can be sent through the post as parcels. Any person forwarding parcels or goods, not exceeding \$333 in value, from any station on the railways for delivery at any other station, can declare that they are to be sent value payable. The railway booking clerk will then furnish a receipt note with the letters "V. P." marked or stamped upon it.

Goods may be sent value payable by any railway by addressing the package to the sender himself. The sender must indorse the railway receipt to the consignee for whom the package is intended and present it open at the local post office, accompanied by the ordinary V. P. form duly filled, the words "Railway receipt note" being entered in the spaces for description of the article. Each railway receipt must bear postage stamps of the value of 4 cents. The receipt notes must not be inclosed in envelopes but be presented open. The post office will then transmit the railway receipt note to the postal office of destination and effect delivery of it on the consignor paying the value mentioned in the V. P. form. The railway will not deliver goods or parcels forwarded value payable except on production of the corresponding receipt note.

The wide scope and the great convenience of the value-payable system in India merit the consideration of American business houses contemplating a wide distribution of their goods through India, as obviously it would seem greatly to the advantage of such firms to make arrangements for distribution of articles ordered from some commercial center in India itself, either by having recourse to some local distributing branch or agency in India or by arranging business through London firms which may be already equipped with distributing facilities in India itself.

STATISTICS AND COMMERCIAL INTELLIGENCE.

It is announced that in consequence of the appointment of a Director of Statistics of the India Government, in addition to the appointment of the Director General of Commercial Intelligence, the heads of business hitherto dealt with by the latter have been divided, so that the newly appointed Director of Statistics has charge of all questions relating to statistics, including questions connected with the preparation of crop forecasts, the publication of the Review of the Trade of India, and the preparation of rate lists.

The Director General of Commercial Intelligence will continue to have charge of all other questions hitherto dealt with by the Director General of Commercial Intelligence, including questions relating to the revision of tariff valuations, the publication of the Indian Trade Journal, and of the catalogue of Indian manufacturers.

The Director of Statistics and the Director General of Commercial Intelligence have their offices at No. 1 Council House Street, Calcutta.

MEDIUM FOR FINDING TRADE AGENCIES.

The Indian Trade Journal, issued at Calcutta once a week by the Commercial Intelligence Department, publishes in each issue a column of Enquiries, similar in object to the Trade Opportunities published in COMMERCE REPORTS issued by the Bureau of Foreign and Domestic Commerce. By means of these Enquiries, foreign firms are enabled to get into communication with local Indian import and export firms, and to make known their desire to obtain agents in India for the sale of their goods. The inquiries are published anonymously, but any persons or firms interested in their subject matter may write to the Trade Journal at Calcutta and find out the names and addresses.

As I had not noticed any American firms seeking to find agencies through this Enquiries column, although it seems to be quite freely used by British firms, I wrote to the Director of Commercial Intelligence at Calcutta to ascertain if American firms would be permitted to make use of the Indian Trade Journal for the purpose of getting in touch with local Indian firms and to make known their desire to appoint agents in India for the sale of their various articles. I also asked if any American firms wishing to do so would be permitted to contract for display advertising in the Trade Journal, the same as some British and local firms were doing. In reply, the Director of Commercial Intelligence has written me a letter dated July 19, 1913, in which he says:

Inquiries received direct from American manufacturers who are desirous of appointing agents in any of the ports in India or of communicating with importers or exporters dealing in any line of trade in India would certainly receive immediate attention in this Department and would in ordinary course be notified anonymously in the Indian Trade Journal. Such inquiries should be sent direct to the Director General of Commercial Intelligence, Calcutta, India. American firms can of course advertise in the Indian Trade Journal. Messrs. Reuter & Co. (Ltd.) are the sole agents for all advertisements in the Indian Trade Journal. The company has offices in the chief centers in the United States and any information in regard to rates, etc., may be obtained from them. [The New York office of Reuter & Co. is at 253 Broadway.]

Often, when American firms write to the American consulates in India, requesting their services in finding firms in this country which might act as their agents, it is necessarily a difficult matter to pick

out from local trade lists the particular firms which might be most interested, or which might not already be committed to act as agents for other foreign firms. Moreover, when American firms consult the World Trade Directory, published by the Bureau of Foreign and Domestic Commerce, they may be confronted with the same confusing difficulty as to the particular firms that it might be best to write to, and so frequently they feel it necessary to write to all on the list. Oftentimes, however, certain local Indian firms are just as anxious to get appointments to act as agents for American firms in particular lines as American firms are to secure agents who would be interested in their specialties. I would suggest, therefore, that the Indian Trade Journal would afford an excellent medium of communication between American firms desiring to secure agents in India and Indian firms on the lookout through this Journal to find American firms whose specialties they would like to handle.

The Indian Trade Journal is an official Government publication and therefore naturally possesses the special attention of the Indian commercial community. It appears to be carefully perused in the leading business offices of India. There is no charge rendered for trade notices published in the "Enquiries" column.

AMERICAN CONSULAR OFFICIALS IN INDIA.

At Calcutta, there is an American consulate general. Correspondence relating to matters that are within the jurisdiction of the Government of India at Simla or at Delhi, or with the Commercial Intelligence Department of the Government at Calcutta, are carried on through the American consulate general at Calcutta, who also has consular jurisdiction over local matters in Bengal, and generally speaking, over northeastern India. At Bombay there is an American consulate having jurisdiction over matters in the Bombay Presidency and western India. At Karachi there is also an American consulate, which deals with affairs in northwestern India and Baluchistan. At Madras there is an American consulate dealing with affairs in the Madras Presidency and other States in the extreme south of India. In Burma there is an American consulate at Rangoon. In Ceylon, one at Colombo; there is also an American consulate at Aden in Arabia.

CORRESPONDENCE.

In writing to an American consular officer in India, he should simply be addressed as "American Consul General, Calcutta," or "American Consul, Bombay," etc. As consuls may be frequently transferred from one post to another, or be temporarily on leave of absence, it is inadvisable to use their personal names in correspondence, as this frequently occasions great delay.

It is a part of the duties of American consuls to lend every proper assistance to American trade, and to show all reasonable courtesies to American travelers known to be of good personal reputation. It can not be expected, however, that American consuls will personally solicit business in behalf of any American firm, as they are sometimes asked to do. It is desirable that commercial travelers should personally call at every consulate to receive any suggestions or be

apprised of any special trade opportunities of which the consuls may know. American consuls are forbidden to vouch for the reliability of any firms, local or American, although they may state what might be known as to the general reputation of a firm. To secure information concerning the credit or financial resources of any Indian firm, it is advisable not to address the consul in any particular city, but rather one of the European banks of such city (or financial rating agencies in the United States). An American firm wishing to obtain such information may ask his own banker in America to write for such information from any bank in India with whom he ordinarily corresponds concerning banking matters. The Indian banker would usually be willing to exchange confidences of this sort with corresponding American bankers, but not with individuals or firms that are unknown to him.

All letters addressed to India should have 5-cent stamps affixed. In writing letters to persons in India, the term "Esq., " should be used after the name, as simply addressing a person Mr. —— is considered a lack of courtesy.

HOW TO GET BUSINESS IN INDIA.

[By Louis Coffin, export manager, the United States Playing Card Co., Cincinnati, Ohio.

An American Government expert made the remark that, to most American manufacturers, exporting meant "Latin America and the Far East." If we add Australia and of course Canada, his remark is probably true, in general, of 90 per cent of such exporters. Now, there is one market to which American exports are absurdly small and which deserves many times the attention we have hitherto given it, and that is India.

It is vaguely realized that India is a very large market, but very few appear to have any practical conception of the enormous extent to which it can absorb goods if it once takes to them. Bombay and Madras alone, if an article finds favor there, seem like bottomless pits into which supplies may be sent in an endless stream. Karachi, Calcutta, and Rangoon are by no means small buyers. Our company manufactures a small article in very general use, and the goods we send to India retail there for about 10 cents apiece—one of them lasting the consumer indefinitely; yet we are to-day nearly nine months behind in filling orders for our Indian trade. Of course, such a business can only be done with an article in general use by the natives, but if one has something of this kind and can once get it firmly established there, there seems to be no limit to the quantity the people of India will take.

One may think that it is a cheap market, and that is undeniable, but so is China, and yet American exporters devote a great deal of attention to China whereas little or nothing is done in India. Moreover, the Indian market possesses one peculiar characteristic which operates against one at the start and later in his favor—that is, when the native becomes accustomed to an article and it gains his full confidence it is exceedingly difficult to shake its popularity. If goods are once well established, the seller is not likely to be seriously troubled thereafter with European competition. The native Indian, except for his natural conservatism, is not illdisposed toward American goods—rather the reverse.

American export commission houses, with three notable exceptions, have, like our manufacturers, little or no foothold, and nearly all of the export business to India is in the hands of old-line British indentors and the continental houses of Paris, Hamburg, Vienna, and Amsterdam. The obvious thing to do is to introduce goods along the lines of least resistance—that is, reach Indian buyers and English houses in India through their time-tried London or other European connections.

The writer may be censured for recommending application to British houses for starting an American article in India, but it is believed that the three American commission houses above referred to will be inclined to take the same view. To put it plainly, Americans are doing only a fraction of what they ought to do in India to-day.

Now, there are many British houses in India who will not buy from an American firm, through patriotism or prejudice. Many firms, particularly native, will not buy at all through any but their own connections in London and they will buy, too, almost anything that these connections recommend. It is advisable to introduce American goods by inducing those houses which are the regular source of supply for Indian importers to take up the articles and recommend them to the Indian firms. Once the goods are introduced and established, the market is theirs and the entry of other American goods is made just that much easier.

This Indian market is an important subject and merits much thought, if one makes an article that can be used by the natives. It may be said, in general, that if the Chinese can use it the Indians can.

If one is interested, there is no reason whatever why the market should not be given a good trial. Freight rates, while they have increased to a marked degree, are still quite low enough. There are direct sailings from New York and reasonable insurance, besides plenty of lines which transship at European ports.

If a concern has a London office it should detail the best man it has from there; if not, one should be sent to look up the merchants in London doing business with India. If he can convince them that his goods are right, his price reasonable, and his terms fair to them, his firm will be surprised at the business obtained, particularly if he does not restrict his dealings to any one firm and is assisted with a vigorous advertising campaign. This last does not necessarily imply a heavy expenditure. If British-Indian trade journals can be used to advantage, prices will be found reasonable and the results excellent.

Two last words of caution. Do not try to sell direct to native houses, but leave that task to the indentor who makes it his business. Finally, be sure that goods are plainly marked "made in U. S. A." or if not, that the firm name appears on them, followed by the city and the letters, "U. S. A." A Philadelphia firm recently suffered the confiscation of a quantity of merchandise because the packages were marked "_____ & Co., Philadelphia," without the letters "U. S. A."—the customs officers contending that there was nothing to show that Philadelphia was not a city in England. The merchandise marks act is somewhat obscure and involved, but it does not pay to disregard it.

LONDON AS A MEDIUM FOR AMERICAN TRADE.

While in London for a few days, en route to British India, I made some investigation as to the possibility of American manufacturers extending their export business in British India through the medium of leading merchants in London, already successfully engaged in the India trade, and with well-established agencies or connections at the leading trade centers of India.

It may not have occurred to some American manufacturers in position to export to India, but who possibly have been deterred by thought of the trouble and expense of sending representatives on the extremely long trip thereto and of arranging for permanent pushing of their business there amid conditions not well known to themselves, especially as regards credit to customers, that in London, which is within much more convenient reach of the leading manufacturing centers of the United States, there are numbers of merchants or factors who make a specialty of handling export trade for the India market on a commission basis. They do this by direct purchase, or by arranging finance or attending shipments, and would be glad in many instances to place their services and long experience at the disposal of American manufacturers who might wish to do business through them.

AN ECONOMICAL INTRODUCTORY METHOD.

It seems probable that in a number of instances manufacturing concerns in the United States could arrange export business to India with more convenience and less expense by dealing with well-known London mercantile houses than by attempting to pioneer their own way direct into the Indian market. This would certainly seem to hold true in many cases where introduction of American goods into India would be in the nature of an experiment not justifying at the start a large outlay of money for sounding this market, and also especially when there is doubt as to the amount of risk involved in giving credit to native customers.

In the Mercantile Yearbook and Directory of Exporters in London there are over 100 firms listed as making a specialty of export trade to India, including Burma and Ceylon. Practically all these firms are well represented at Bombay, Calcutta, Madras, Colombo, and Rangoon, and in some smaller centers. With some of these firms the initiative in arranging for importation of goods into India is taken by their India houses, while they merely attend to some of the details of making shipments and arranging for their financing. In other cases the London house acts as the principal in export transactions, while the India houses are in the position of subsidiary branches and agencies acting under instructions from London.

The Mercantile Guardian, published in London, presents monthly the names of importers in Calcutta, Madras, Rangoon, and other

ports, with the details of their imports each month, and in the case of these importers being London houses importing through their branches it becomes easy by perusal of such lists to observe the volume and kind of business done by these London merchants in different localities of India, and it is possible to ascertain the specialties in which they might be willing to transact business for American account.

WILLINGNESS OF LONDON HOUSES TO TAKE AMERICAN ACCOUNTS.

I have broached to a number of London merchants engaged in the India trade the possibility of their being willing to cooperate with American manufacturers in promoting the sale of American goods through British India, and have found in most instances that there would be perfect readiness on their part to arrange for selling in India any American products which might peculiarly suit conditions in India, and which could be sold with the prime essential of cheapness. It seems to be the belief of many of these merchants that most American manufactured products sell on too high a basis to be available for the India market, but on this point they are willing to receive information from American firms which might convince them otherwise and perhaps lead to the transaction of considerable business.

A fair amount of business with the United States is already being done by some of these merchants in hardware and machinery lines, tools, tin plates, wire nails, tinned goods (especially canned salmon), and cotton piece goods. There seems no doubt that a great many more London exporters than are now handling American goods would take up such articles and be prepared to push their sale in India if more detailed information were available from American manufacturers as to such specialties and on what basis they might be offered for sale in India.

Some of these merchants who are evidently exporting large quantities of English goods to India, seem to show a surprising lack of knowledge as to American manufactures which might be equally or even more suitable to market conditions in India if prices were as low. Most of the merchants who expressed opinions concerning the possibility of extending a sale of American goods in India stated that such trade would have to be transacted on strictly competitive terms, but that in cases where American goods are well adapted to the India market and could undersell English goods, they would have no hesitation in accepting agencies for such lines or making direct purchases in the United States of such goods for export to India. In most cases where I found London merchants were already selling American goods in India, such goods were purchased by them through their representatives in New York or through representatives of American firms in London. Most of the London houses exporting goods to India also trade in the other direction, especially in importing from India and Ceylon tea, hides, rubber, and various drugs and chemicals, and some are connected with manufacturing enterprises in India producing jute bagging and cotton cloth and some with sawmilling in the teak forests of Burma, etc.

CLASSES OF SALABLE GOODS—FORM OF NOTICE.

It was impressed upon me that there might be specially good opportunities for American trade extension in India in connection with cotton piece goods and metals, such as bars and sheets, plain and galvanized, also in pumps, various specialties in tools, electrical equipment, and in motor cars. In case, however, American manufacturers desire to open trade with London firms in such articles for export to India, they should be willing to help them with all the information possible. One London firm gave me a copy of a circular concerning information they require from firms which desire them to act as agent in the India export business. This circular may be considered a fair sample of information most of these London merchants would require from American firms seeking to do business with them, and reads as follows:

We offer you our services in case you are anxious to push your goods in the markets of Bombay, Calcutta, Madras, Rangoon, Delhi, and Colombo, provided you will send to our London house direct, free of charge, for us to post and forward out at our expense to these cities in India:

1. Six sets of trade catalogues, ordinary or illustrated. (We prefer these without your name or stamp.)
2. Six sets of price lists stating separately best wholesale export discounts, also cash discounts where goods are delivered, and if packages are free.
3. Six sets of free sample collections, such as can be conveniently sent out or posted by us to our friends abroad.

P. S.—All communications to be in English only.

One firm stated that last year it sold in India about 500,000 cotton blankets, all made in England. It did not see why American manufacturers should not also be able to supply cotton blankets for the India trade, and they would be very glad to sell American cotton blankets in India if the right qualities at the right prices could be obtained. The firm stated that as an instance of the cotton-blanket business it does in India, the prices, c. i. f. Calcutta, range between 7d. (14 cents) per blanket made of waste cotton in 36 by 78 inches, weighing about 1 pound each, to 1s. 9d. (42 cents) in 48 by 96 inches, weighing about 5 pounds. In better qualities, 2s. (48 cents) and upward, there is no turnover worth considering. In other cotton goods qualities and prices are equally low.

This firm also suggested that there might be a good opening in India for American made-up cotton umbrellas, also cotton shawls and fancies; but in all cases such goods must be suitable for the native Indian trade.

GOOD PACKING AND QUALITY—TRADE OPPORTUNITIES.

Some complaint was heard among a few London merchants that instances had occurred when American articles in the India market had had the reputation for quality seriously damaged by an occasional carelessly packed or bad shipment. It was mentioned that in case of larger business being done there should always be the greatest care to insure good packing and regularity in the quality expected, not only that the London merchants themselves and their agents in India should experience no loss, but that customers should be so well satisfied that the business could increase instead of being suddenly curtailed, as occasionally occurred in the past. In other words, establishing reputation for reliability will be the best asset for increased trade.

ADVERTISING.

The problem of advertising suitably articles of merchandise in India requires special attention and consideration of local conditions in order to reach likely purchasers out of a total population of over 315,000,000 people, only a small percentage of which can read the English language, and perhaps not even 50 per cent of which can read the native vernaculars.

Newspaper advertising, even though it reaches only a small proportion of the total population of India, is probably the best general medium for advertising such articles as are used by the most well-to-do and well-educated persons with a high standard of living. Although, in proportion to circulation, Indian newspaper rates for advertising are high as compared with the United States, nevertheless expenditure in such advertising, if kept up liberally and persistently, undoubtedly produces good results. If through such advertising a demand can be established for various articles by even a limited number of persons, but sufficient to cause leading dealers to keep them in stock, an important foothold is gained for a much wider business, which may come from a great number of other customers who may buy such articles when they see them displayed in shops, or when they notice their use by other persons in whose judgment and taste they have confidence.

STATISTICS AND ADVERTISING RATES.

The latest statistics of newspapers in India show that there are 658 newspapers and 1,902 periodicals published in this Empire. They are chiefly in the English, Tamil, Urdu, Gujarati, Marathi, and Bengali language. A few trade papers are included among this number, several of which afford good mediums for reaching possible users of machinery and engineering appliances. The leading newspaper in Bombay (*Times*, of India), which circulates chiefly among Government officials, the military element, European and Indian clubs and the European population generally, Indian princes, and other well-to-do natives, has furnished me with advertising rates, which show a charge of about 65 cents per inch each if for 12 insertions of ordinary trade announcements, with a reducing rate according to frequency of insertion down to 32 cents per inch for 104 insertions, 25 per cent extra being paid for special positions, and 50 per cent extra for positions next to editorial matter.¹

ILLUSTRATIONS BECOMING POPULAR.

Pictorial advertising is undoubtedly of peculiar benefit in India, as it appeals to people of many different languages and even to those who are illiterate. The advantage of this sort of advertising has

¹ A list of the newspapers of India which are suitable for advertising purposes, together with their rates, etc., will be found in *Miscellaneous Series No. 10, "Foreign Publications for Advertising American Goods,"* for sale, at 25 cents, by the Superintendent of Documents, Washington, D. C.

lately caused the organization of several firms for the particular purpose of drawing pictures for use by advertisers. For popular advertising of simple and cheap articles, to reach all classes of people, there is no better method than to display pictures or trade-marks of the same, so they are frequently and constantly to be seen in even the most out-of-the-way places. Sometimes merely a letter or initial of a firm, with the trade-mark and some simple picture, helps business better than a great deal of descriptive advertising literature, which many people can not read or understand.

ADVERTISING IN STAMP BOOKLETS.

The Indian post office is making a trial experiment of issuing advertisements in the booklets in which half-anna (1 cent) and anna (2 cent) postage stamps are sold to the public. A certain number of these booklets have been issued with advertisements on the covers, and these advertisements will subsequently extend to the interleaves. It is understood that the post office department is about to call for tenders for complete sets of advertisements. It is anticipated that there will be wide applications to advertise in the booklets, as about 2,500,000 are now sold annually, and the sale is increasing at a heavy rate each year. American manufacturers who might be interested in advertising in these booklets might address the Director General of Posts and Telegraphs, Simla, India.

CINEMATOGRAPH ADVERTISING.

While visiting the Central Library Department of the Government of the native State of Baroda, in western India, I was apprised of an interesting scheme carried on by this department for giving cinematograph shows throughout Baroda for industrial and agricultural education of the people.

I asked the manager of this department if it would be agreeable to receive from the United States industrial films, which while advertising various American agricultural appliances, machinery, and other articles, would likewise, perhaps, be of much educational benefit to people in Baroda who had never had opportunity of seeing such articles in actual use. He replied that industrial films contributed by manufacturing firms of the United States for the visual instruction branch of the Central Library of Baroda would be heartily welcomed and displayed throughout the State. He later sent me a memorandum on the subject, as follows:

The cinematograph used by our visual instruction branch takes films of the standard size, a sample of which is inclosed. We shall be glad to receive the films and exhibit them through the State. The films thus supplied will prove a very good free advertisement, because the people here are particularly interested in foreign industrial films.

The object of the visual instruction work to be carried on by the Baroda Central Library Department was explained as follows in the Library Miscellany for November, 1912, a periodical published by this department:

The department is determined to make fresh efforts day by day to make itself more useful to the public, and especially to that large portion of the public who have either no taste for reading or can not read. For this purpose the central library has recently purchased for its traveling library branch a number of stereoscopes and stereoscopic

sets of travel tours. These stereographs are arranged systematically in tours of countries and sections, and are accompanied by simple locating maps and authoritative explanatory books. The realistic mode of sight-seeing is enjoyed by the least studious as well as the most highly educated readers, and is a very effective means of diverting from light reading to more serious reading of books of travel, biography, and history.

The library has also been giving for some time past cinematographic shows to the college and high-school students in the Baroda city, but it has quite lately extended its operations to a few towns and villages of the Baroda district. The Maharaja has kindly lent his private cinematograph machine for this purpose to the library, which he is soon going to transfer completely, with all the slides and films. The country folk seem to have thoroughly enjoyed these shows, and the Maharaja is contemplating the opening of a visual instruction branch of the Central Library. (Subsequently, in January, 1913, a grant of \$3,500 for a year was sanctioned by his highness.)

The important possibilities connected with illustrative advertising in India by cinematograph shows is beginning to be taken advantage of by a few European firms which, by moderate expenditures of money, have arranged with many cinematograph enterprises in this country for the inclusion of their industrial films on the program of the evening's regular entertainment. A small charge is made in such cases for using these films, usually not exceeding \$15 per month, or sometimes in lieu of such charge the firm desiring its films exhibited publishes at its own expense the theater programs, including, of course, its own advertisements.

As an instance of such advertising in India through the cinematograph, one leading European firm promotes the sale of condensed milk by exhibiting pictures showing the insanitary conditions in milking cows in India; also the frequent adulteration of milk with water taken from tainted sources of supply, and then in contrast its own sanitary method of milking cows and condensing the milk by modern apparatus, insuring purity. Another firm, promoting the sale of French wines, shows pictures of its vineyards and the interesting method of making the wine.

CINEMATOGRAPH THEATERS.

BOMBAY.

[By Consul Edward J. Norton.]

The hour for beginning cinematograph performances in Bombay varies, being dictated by the length of the feature offered. At the five principal cinematograph and vaudeville theaters there are two programs each evening; the first commences at 6.30 p. m. and the second at 10 o'clock. Two of the popular-priced theaters show three programs each evening. All-film theaters, four in number, offer a continuous entertainment, commencing at 6.30 p. m. and lasting until midnight. Midweek or Saturday matinees are occasionally given, but the managers of all the theaters agree that regular afternoon shows would not be popular.

The standard price for the best seats in the Bombay theaters featuring vaudeville and moving-picture entertainment is 95 cents, the scale grading down to 17 cents, according to location. At the purely cinematograph theaters the standard price for the best seats is 32 cents and grades down as low as 4 cents.

EXTENSIVE ADVERTISING—FILMS USED.

A noteworthy feature of the picture-theater business here is the amount of advertising that is done to attract public attention to special films. Six to eight columns of cinematograph-theater advertising is carried by the English daily newspapers and probably much more by the vernacular press. Billboard and poster advertising in the vernacular is also spread throughout the city.

The principal theaters in Bombay run about 5,000 feet of films daily and the program is changed weekly. Most of the pictures shown are hired or purchased from the local agency of Pathé Frères. These films are generally Pathé's own production and in some cases the production of small manufacturers who market their pictures through Pathé. British and Italian firms also do a fair amount of business with local theater men. Pathé Frères occasionally bring out "America Kinema and Comica" pictures, but as they are interested chiefly in their own productions they handle few first-class American films. From time to time local theaters bring out Vitagraph or Edison films, either through London agents or through direct importation.

Although there are several small film importers in Bombay, Pathé Frères have practically no competition in this market; their weekly gazette is popular, and their films, which are nearly all secondhand, are said to be in good condition and remarkably free from blemishes. They keep an operator here to supply special Indian subjects for Europe or America and also to take pictures for local theaters whenever anything of special interest occurs.

AMERICAN AGENCY IN BOMBAY SUGGESTED.

Exhibitors seem to think that American film manufacturers would meet with success if they opened an agency in Bombay, provided they send out secondhand films; there is evidently little business to be secured in new pictures. Considerable money is now invested in the cinematograph theaters of India, and public interest in motion pictures is steadily increasing, and it seems as though the outlook for business would lead some American firms to open a branch at Bombay. Nearly all the largest cities within the limits of this consular district now have motion-picture theaters, and an Indian branch agency could easily handle and develop business in Ceylon and the Straits Settlements, where the picture theater flourishes as it does in India.

RANGOON.

[By Consul Maxwell K. Moorhead.]

Motion pictures are shown daily in Rangoon by the Edison, Alhambra, and Star bioscope theaters. The performances last from 9.30 to 12 every night, including Sunday, admission to which costs \$0.16 to \$1. Most of the films are rented by the bioscope theaters from the Singapore agency of Pathé Frères. The films of Gaumont & Co. (Paris) are second in number used. A few American films find their way to Rangoon via the Far East. Neither of the two French companies has an agency in Rangoon.

The local bioscopes are not able to purchase films outright. Most of the shows in the East are individual institutions with little capital, so that a hiring agency does a big business. A branch established in Singapore or Calcutta, with agencies in Rangoon, Bangkok, Colombo, Madras, etc., with American films for hire, would probably do a good business. Films of American Indians, comedy scenes, wars, fights, and pictures of exciting events with much action are in great demand. Pictures with a moral to them or those requiring a knowledge of history are not favored. Scenes of the Balkan war and of the Chinese revolution would have been popular, if available, on account of the large Mohammedan and Chinese communities in Burma.

KARACHI.

[By Consul James Oliver Laing, Karachi.]

Only one cinematograph establishment is in operation in Karachi. It is in a substantial stone building to which a second story and corrugated iron roof are being added. Two performances are given daily, both in the evening. The performance is long and the admission to a reserved seat is 2 rupees (65 cents).

A feature in films which should be avoided in this market is objectionable comment on or portrayal of religious subjects. Mohammedans, Hindus, and other religious sects are keen to see any apparent slur and to resent it.

The Karachi establishment referred to was recently sued by Mohammedans on account of a film used depicting a scene in the life of a prophet. The Mohammedans alleged that their Prophet and their religion had been insulted. The court dismissed the suit, as no proof existed that the manager of the house had had any intention to insult anyone. The film was merely a fanciful representation of a supposed incident in oriental life. Offense was nevertheless unintentionally given and the case dragged on for several days. Religious films for this part of India should be carefully scrutinized.

BUILDING CONSTRUCTION.

One of the most significant developments in connection with the construction of large buildings in India has been the increasing use of American reinforcing steel for concrete construction and of various American roofing materials made of heavy wool felt, saturated with gummy compounds to render them waterproof, also rubber and asbestos compositions, etc.

The use of expanded metal and reinforcing bars, imported from the United States, has greatly increased economy in recent construction of buildings in India, as such material when used in the erection of walls, floors, and ferroconcrete roofs saves labor cost and space and is said also to be cooler and more sanitary than native material. Its extensive use in India has been specially promoted by one Detroit firm, which employs in India trained engineers from the United States who on arrival in India make careful study of local conditions and then furnish technical advice, supervision, and selling assistance to the different local agents for this product. They take care that contractors in charge of buildings using such reinforcing steel make no technical mistakes in the use of such material in building construction.

NOTABLE NEW BUILDINGS IN CALCUTTA.

Reinforced-concrete construction is most in evidence in Calcutta. The Improvement Trust of that city has lately selected such method of construction for the first experimental blocks of buildings for the poorer classes, at Manicktollah, a suburb. This project is intended to accommodate persons displaced from other improved blocks and comprises 248 rooms, each 12 feet by 12 feet, with a 4-foot veranda, and opening onto a central passage 7 feet wide. The structures will be in blocks 200 feet long and three stories, with latrine accommodation at each end. All flooring and roofing are on the expanded-metal system of reinforced-concrete construction. Some thousands of feet of reinforced brickwork are also being used. The floors are designed to carry a live load of 75 pounds per square foot, over 6-foot spans, the floors being 3 inches thick with concrete in the proportions of 1 : 2 : 4, the expanded-metal reinforcement consisting of No. 15 metal, 3-inch mesh, $\frac{1}{8}$ -inch strands. Rapidity of construction and economy in cost were two of the deciding factors in adopting the system.

Among other important buildings lately erected in Calcutta employing reinforcing steel for concrete construction may be mentioned the telegraph-office extensions (staircases and balconies), stamp and stationery office, ladies' annex, United Service Club, Bengal Nagpur Railway offices, Government House and Government House kitchens, Bengal Club, Indian Museum, etc. In Bombay this method of construction has lately been employed in the substation of the Bombay Electric Light Co. and in the large new sawmill of McKenzie's (Ltd.), of this city.

AMERICAN ROOFING USED.

American composition roofings have also been lately employed on railway carriage roofs and on bungalows and stations of the East Indian Railway, on the Royal Insurance Building, head office of the East Indian Railway, the United Service Club, Soorah jute mill, opium godown, new secretarial building, port commissioner's head office, general hospital, municipal pumping tank at Tallah, and the nurses' quarters at the medical college hospital, all in or about Calcutta. The Calcutta Tramway Co. is using reinforced American roofing for its cars, and the British India Steam Navigation Co. (Ltd.), of Calcutta, is using it for the decks of its steamers. At Bombay American reinforced roofing materials are used on the Chartered Bank of India, Australia, and China, the Orient Club, and on the Forbes Building, where the American consulate is located. At Madras such roofing is used on the public works department building of the Madras Presidency and for roofing and gutters of the Government Museum; also for the Arsenal and Fort of St. George in the Madras Presidency.

In connection with the Tallah tank at Calcutta on which American roofing material is used, it may be explained that this tank is the largest of its kind in the world, being 320 feet square, 16 feet deep, and having a capacity of 9,900,000 gallons, which the people of Calcutta consume every eight hours, making nearly 30,000,000 gallons per diem. The steel construction is 106 feet high and is erected to support a high-pressure reservoir for that city. It is said that the use of American roofing over this immense tank keeps the water for the use of the people of Calcutta both clean and cool.

LABORIOUS METHODS—OFFICIAL INSPECTION.

Building operations in India have hitherto been noted for undue cost and unwieldy construction in many particulars. For instance, it may be mentioned that the Taj Mahal Hotel in Bombay, the largest in India and one of the most recently built in Bombay, despite the great cheapness of native labor, cost \$1,330,000 and took nine years to construct. Steam power was used for pumping out the foundations, grinding mortar, and for cutting up scantlings, but the sawing of logs and every other work was carried out by manual labor. Lifts, or elevators, were established on the completion of the building, but all the material of construction was raised, even to the top of the dome, either by manual winches or on the heads of coolies who walked up and down very steep gangways of rough bamboo. There were no woodworking machines employed except one circular saw.

Many houses in India fall every year during the heavy rains at the break of the monsoon, and as a result, chiefly of disasters, there is now much more rigid official inspection of building operations in the leading cities of India, and capitalists in India show less inclination to erect buildings without the aid of competent architects and building contractors. The new building regulations of Bombay require all work to be done under the supervision of a qualified person who shall be accepted as such by the architectural inspector of the corporation. These regulations leave the building contractor as he is, but the architect employing the inspector is held finally responsible for the quality of work and safety of the design.

BUILDING ACTIVITY—INDIAN MORTAR MILL.

Building operations in Bombay as well as in Calcutta are active. New houses are generally 5 to 6 stories of 16 feet in height, and yet there is not anywhere a lift carrying building materials nor any pneumatic machine at work for carrying the soft sandstone used so much on façades. In construction, however, of the new docks at Bombay, now in progress, the best modern appliances are being used.

The Indian mortar mill consists of an edge runner stone, working in an annular trough about 20 feet in diameter and 18 inches deep. The stone is fixed on a pole hinged to a central pin at one end and attached at the other to a draft animal that works on a circular path of about 15 feet radius. Its value complete is about \$50. The trough is roughly lined with masonry, and mortar ground in it is rarely free from lumps. Brick joints are therefore wide and the settlement great in proportion. Winches and pulley blocks are used without oil, and the favorite method of raising weights is lifting by rope and blocks with a gang of men, who pause after each pull, while one of their number often chants a refrain.

CONTRACTORS AND CARPENTERS—LOAN RESTRICTIONS.

An average building contractor in India is usually a person who has money or credit, but who does not himself always understand drawings or measure up work, and must therefore depend on clerks for this duty. The foremen are frequently more labor contractors than trade experts, and in the execution of work there is often serious friction between architects and contractors. Moreover, on the part of the owners of projected buildings the chief desire is often for showy façades, and allowance is given for only the lowest building rate for masonry and woodwork. The masonry, carpentry, joinery, plumbing, and painting, except in special cases, are all inferior. A builder will occupy the sidewalk of a busy street for a couple of years as a store for building material, which is delivered prematurely instead of being brought day by day as wanted, while the interior of the building may be filled with rubbish.

The carpenters and joiners must usually find their own tools and rarely have more than a third of a set.

As borrowed money in India for building purposes usually costs 7 to 9 per cent per annum, the long time required for construction of buildings and their apparently needless cost must naturally retard greatly important investments in buildings in India. For instance, although rents are steadily increasing in the leading cities of India and are becoming a serious tax on the incomes of a large section of the people, yet building operations which ought to show a good profit in meeting a demand for new houses do not nearly keep pace apparently with the growing requirements of the country and the increased general prosperity and higher standards of living.

INTRODUCING MORE EFFICIENT METHODS.

Possibly there would be a field in India for American architects and building contractors, who might introduce more efficient and economical methods and thus make buildings cost much less and give more

safety and comfort. It would be necessary, however, in such instances to study local peculiarities and desires in architecture and to construct buildings or dwellings with a special view to their reasonable coolness in the intensely hot summer climate that prevails through most parts of India. The bungalow type of dwelling in India is well adapted to the country, and in its main essentials would always be required.

Most dwelling houses in India are owned by native landlords, who are used to Indian methods of building and might be disinclined to employ American architects or builders, especially if the American plans showed greater expense than those to which they are accustomed. However, in erecting especially fine buildings, as in the case of office buildings, banks, hotels, and Government buildings, there would seem to be a reasonable chance of good architects and builders finding remunerative work. It must be explained that on the part of the European population there is not the large investment interest in building or house properties as in the United States, and few Europeans own the houses in which they reside, this being because most of them feel that they are in India only for a temporary term of years, so that it would not be wise to buy property that they could not readily sell again. There is undoubtedly room in India for foreign real estate and building construction firms with sufficient capital to buy land in desirable localities, erect houses of approved modern types, and rent them at good rates to the transient but well-to-do European population.

NATIVE HOUSES AND VILLAGES.

As regards native habitations, it may be explained that the houses of an Indian village are generally clustered together, giving it the semblance of a little town. Each village community, before British rule, concentrated its inhabitants for defensive purposes. It was often at bitter feud with the villages that adjoined it; and in northwestern India it was constantly threatened by marauding immigrants, and very frequently protected itself by an earthen rampart.

In Bengal a different custom prevails and the cottages are scattered over the fields, not because there has been no occasion for defense but because the people have been conscious of their inability to defend themselves. In northwestern India the houses are generally flat roofed—constructed of kneaded clay—after a fashion that was perhaps introduced from central Asia. Often a sun-baked mixture of ordinary mud with cow manure is used. They stand close together, often with surrounding mud walls inclosing them in groups.

Farther east in India the roofs are gabled and tiled. In Bengal thatch is used; the roofs are highly gabled, with the ends of the roof-tree bent downward toward the ground so as to offer as little resistance as possible to the violent winds that descend upon the country during April and May. In the southern peninsula gabled roofs are the rule; each house possesses a little garden of its own which gives an air of amenity to the village. Speaking broadly, in Upper India a house consists of a courtyard round which are disposed buildings for men, women, and cattle, presenting to the roadway an expanse of blank wall.

In eastern India and the peninsula, village houses front the street through a yard or garden, and resemble more nearly the conventional cottage. In the towns, where land is valuable, yards are dispensed with and the fashion of house construction approaches that of Europe. The streets are overhung with projecting balconies, often elaborately carved. In Kashmir ordinary grass sod is placed on the roofs, and various wild flowers, as well as tall weeds, etc., may be seen growing up from house tops. Locally made brick tiles, as well as imported corrugated iron, are much used for roofing material throughout India.

PRIMITIVE HOTELS IN SPACIOUS GROUNDS.

The hotels of India, except in Bombay and Calcutta, are usually built in compounds and composed of a number of small buildings with perhaps one main building and are usually not over three stories high, and frequently not over one story. In the greater number of hotel rooms the accommodation is primitive and with little regard for up-to-date comfort and appearance. There are no telephones in the rooms and generally no bells for calling servants. To reach the dining room or the main office it is usually necessary to go into a separate building. Except in the two leading cities, elevators or lifts are practically unknown in hotel buildings.

The grounds surrounding these hotels are usually quite spacious, and the hotels are commonly situated in military cantonment areas and far removed from business centers or native quarters. There is an important purpose in building hotels in rather remote localities, as it is desired that they should be as far away as possible from districts notoriously insanitary or where plague rats are prevalent. Leading banks and shops often have extensive gardens in front of them, and often in appearance they seem like private residences. Generally speaking, buildings in India of all kinds take up a great deal of ground room in proportion to their height, and more attention is paid to external appearance, gardens, etc., than to inside equipment. Hotels and private residences rarely have any rooms for servants, who live in separate structures called "chawls." Usually outside the leading cities the kitchens also are separate from the houses.

METALLIC GATES AND SASHES—QUICK DELIVERY.

In the construction of banks, public buildings, railway stations, hotels, shops, stores, theaters, etc., collapsible steel gates are now being much used in India. It may be mentioned, also, that metallic sashes are beginning to be used in India in connection with factory construction. Corrugated iron window drops are commonly used to close over the windows of leading shops at night.

In all articles required for building construction in India speedy delivery is usually a matter of great importance, for goods of such nature when ordered in India are generally urgently required. One leading Bombay firm, which makes a specialty of expanded metals, reinforcing materials, sanitary fittings, and other engineering requisites for building construction, suggests that American manufacturers who desire to promote interest in their lines in India should furnish catalogues of rates and discounts on a c. i. f. basis Bombay

or Calcutta, and that f. o. b. prices are useless in India, as it is too difficult to estimate the freight. It was also mentioned that if American manufacturers gave cable code words in their catalogues there would be a better chance of business being done.

SAND-LIME BRICK FACTORY IN BOMBAY.

A factory for making bricks for the Bombay market from a mixture of sand and lime has been started by the Bombay Brick & Tile Manufacturing Co. (Ltd.). As ordinary Bombay bricks are of low quality, it is thought that the sand-lime bricks will find a ready market. The new company holds valuable Government concessions, insuring a plentiful supply of sand and lime at low cost. The factory is situated near Marve Bunder, in the Bombay Presidency, and transport to Bombay will be by sea.

The bricks are made from slaked lime and sand and finished by the steam-hardening process under high pressure that is said to have been first tried in the United States about 1901.

CEMENT FACTORY IN THE CENTRAL PROVINCES.

A Portland cement factory, recently started at Katni, in the Central Provinces, by the Katni Cement & Industrial Co. (Ltd.), will turn out from 30,000 to 35,000 tons per annum. The cement will be packed in bags and sold, it is said, at considerably lower prices than for imported Portland cement. The cement will be manufactured by the wet process in rotary kilns driven by electric power.

In addition to the cement works the company has erected works for the manufacture of roofing, ridge and ceiling tiles, glazed wall and flooring tiles, fire bricks, glazed drainage pipes from 3 to 30 inches diameter, glazed earthenware troughs for carrying electric cables, acid-proof jars, crucibles, and a number of hospital requirements. Roofing tiles, fire bricks, and drainage pipes will be put on the market in a short time and the other articles mentioned will follow in due course.

BUILDING MATERIAL IN BOMBAY.

[By Consul Edward J. Norton, Bombay.]

The activity in the building industry and in the engineering works in the neighborhood of Bombay is reflected in the increase of \$268,181 in value of building and engineering materials imported during the year ended March 31, 1914. The total value of imports classified under this heading was \$1,097,921.

Building stone has risen in price, and dear timber is responsible for a heavy demand for steel beams, pillars, and girders from the United Kingdom and Germany, both countries, notably the latter, having shipped larger quantities of iron and steel building material into Bombay.

The abnormal rise in the price of teak in India will probably introduce in a gradual way a new system of construction, together with a number of time and labor-saving improvements. For building operations heavy teak beams are giving place to beams of steel, as there is no other timber available in India which possesses the resist-

Shipments of steel ceiling material have been received from the United States. While local interest has not been specially directed to the advantages of steel ceilings, it is believed that a fair market is offered for this class of material.

Reinforced concrete structures are now seen in different sections of Bombay, and are likely to be the basis of a new system of building adapted to such uses as tenements, warehouses, and structures for light manufacture. Within the past few years different kinds of mesh concrete reinforcement have been successfully used, and the material is favorably regarded by architects and builders.

MARKET FOR CEMENT IN MADRAS.

[By Consul José de Olivares, Madras.

Extensive construction work in progress in various parts of the Madras Presidency has resulted in an unprecedented demand for Portland cement.

The greater part of the cement used in South India is imported from the United Kingdom.

It is reported that the recent completion by the South Indian Railway of an exhaustive survey of Adam's Reef, between the island of Rameswaram and Ceylon, has demonstrated the practicability of constructing a causeway to link up India and Ceylon at a cost which renders the project feasible. In the event that this work is undertaken the future demand for cement in this consular district will be enormous.

Improvements in the harbor works at Madras are resulting in the annual employment of 1,600 tons of Portland cement, which rate of consumption will be uniform for the next four years. The demand for cement is further increased by the water and drainage schemes of the Madras Corporation and by the general building activities in evidence throughout the Presidency.

NEW CAPITAL AT DELHI.

INDIA'S NEW CAPITAL TO COST \$25,000,000.

The Viceroy of India, in closing the sessions of the Imperial Legislative Council at Delhi on March 25, 1914, gave all the information at his disposal regarding the project estimates of the new capital at Delhi. He stated that the original estimate of £4,000,000 (\$19,440,000) was considerably under the amount which subsequent expert information had revealed to be the probable cost. The latest estimate is £5,113,620 (\$24,852,193) for the cost of the new city, including parks, lighting, irrigation, and roads, but excluding the military cantonments and railway. The Government will hold £1,000,000 (\$4,860,000) in reserve for unforeseen expenses and contingencies. Under the head of buildings the latest estimate is \$11,995,733, of which about \$2,500,000 is allotted for constructing Government House and the Council Chamber and the necessary appurtenances, with gardens, stables, offices of the private and military secretaries to the Viceroy, bungalows for the staff, and accommodation for the military boards, while about \$3,638,000 is allotted for the Secretariat Buildings of the Government of India. The rest of the money allotted for buildings includes the cost of local administration offices, Chief Commissioner's Office, Imperial Record Office, residences for officers of Government and for clerks, menials' quarters, electric installation in officers' and clerks' quarters, medical buildings, police accommodation, fire-brigade station, markets and slaughterhouse, and accommodation for the Viceroy's bodyguard and for troops in the capital. About \$80,000 is allotted for constructing a railway station with sidings.

For electric light and power \$1,446,900 is allotted; for parks and improvements, about \$900,000; for communications, about \$997,000; for irrigation, about \$900,000; for water supply, sewerage, drainage, etc., about \$2,459,300; and for purchase of tools and plants, \$1,183,500. The balance of the estimated cost is for salaries and allowances, acquisition of land, and other miscellaneous expenditures. The Viceroy stated:

In regard to such public services as water supply, sanitation, and the general laying out and equipment of the new city with roads, public parks, etc., we have based our requirements upon a careful forecast of probable population and made all reasonable provision for future expansion. Although we have considered it desirable to make provision in the estimate for all the residential accommodation that we consider necessary, it is anticipated that private capital will do its share in the development of the new city and erect a proportion of the residences which will be required for the accommodation of officers and clerks in some form or other, in which case we may expect to effect some reduction of expenditure under this head. It does not include public buildings such as museums, institutes, hospitals, other than the civil hospital, etc., which will undoubtedly spring up in the future and cluster around the seat of government.

Much no doubt will be done by private initiative and it is very encouraging to find new educational establishments ready to start in the capital of India, among them being a new Stephen's College, a medical college for women, the Begum of Bhopal

Girls' School, a postgraduate college for the sons and families of ruling chiefs, and a college for Indian medicine. Sites for all of these have been requested and assigned, and it is not too much to hope that Delhi may, in addition to its other features, become an important educational center.

CONSTRUCTION WORK.

The general work of construction is to be carried on by a special committee appointed by the India Government, and known as the Imperial Delhi Committee, which has an office building of its own in Delhi. The president of this committee is the chief commissioner of Delhi, which city was recently separated from the Punjab Province and made into a separate district (like the District of Columbia, U. S. A.), and under the direct control of the India Government through the chief commissioner. The present chief commissioner is the Hon. Mr. William Malcolm Hailey, C. I. E., I. C. S.

PRELIMINARY EXPENDITURES.

At present the only actual appropriation available in connection with capital construction is about \$2,500,000 for preliminary expenses of site preparation. This includes purchase of lands, plants for quarrying stone and for brickmaking, preliminary water supply, construction of roads and tramways for carrying material about, coolie camps, temporary bridges, steam rollers, tip carts, concrete mixers, etc. Much of the material and tools are being purchased secondhand. The tramway system is the main feature of the preliminary expense. About 25 miles of this tramway with a $2\frac{1}{2}$ -foot gauge are being laid in a network about the site of the new city. The new capital site will occupy 3 or 4 square miles of land, and the edge of it will be about $2\frac{1}{2}$ miles from the center of the present city of Delhi. In the preliminary work of preparing the site about 6,000 men are now employed. When the work is in full swing from 15,000 to 20,000 men will be steadily employed.

PLACING AMERICAN CATALOGUES—PREFERENCES FOR BRITISH MATERIAL.

The chief commissioner of Delhi (Hon. W. M. Hailey) mentioned to me that any catalogues of American manufacturers or letters having to do with any machinery, tools, or material which might be desired in connection with the new capital construction had better be sent to the chief engineer, H. T. Keeling, Esq., A. M. C. E., Imperial Delhi Committee, Delhi, India, whose active attention would be given to such matters, and whose recommendations regarding purchase of such articles would probably be acted upon. It was explained that urgent purchases would be made in India, also stone, bricks, timber, etc., but that any machinery, tools, etc., not urgently required or kept in stock by dealers in India would be purchased through the Director General of Stores at the India office in London and indents prepared by the Imperial Delhi Committee.

The regulations regarding purchase of articles for the capital construction are the same as those for all Government departments, both imperial and provincial, in British India. (See the article on "Method of purchasing Government stores," p. 147.) It is probable

that it will be the policy to give preference to British manufacturers in making purchases for the new capital, unless in the opinion of the chief engineer articles of American manufacture might possess some special advantages or could be more readily obtained, especially if kept in stock in India.

ELECTRIC PLANT—BUILDING MATERIAL.

There will be an electric installation at the new capital available for electric lighting and for furnishing power for any machinery that may be used in connection with the construction work. There is already available a plant of 2,200 kilowatts capacity, which was erected for use during the Durbar pageant several years ago, and this will have its power capacity increased as circumstances may require.

The building material will be chiefly red and white freestone from central India for the better class building and stone found near Delhi for subsidiary structures. It is expected that brick tiles will be used for roofing except when the roofs are flat, when it is likely that American preparations of felt, rubber, or asbestos will be used. The new secretariat buildings, which will be the first to be erected, will be equipped with electric elevators.

RESIDENCES—LABOR—REMOVAL OF OFFICES.

The city of Delhi has a population of about 236,000 people. The permanent population will probably be increased by the residence here of 3,000 or 4,000 Government officials when the new Government offices are ready. These officials will require private residences for their accommodation, and these will also have to be built within the near future. The Imperial Delhi Committee is reserving considerable land for house building, but no allotments have as yet been made. It will probably take four or five years altogether to complete the great work of building the new capital.

Good labor is not very easy to obtain at Delhi and a great deal of skilled labor will have to be imported. For ordinary unskilled labor the wages at Delhi amount to only about 12 cents per day. At present there are a few temporary Government offices at Delhi, but these are not nearly adequate for the purposes of Government administration, and until the new capital is practically completed, or at any rate for a year or so more, the chief administrative work of the Government of India will be performed at Simla all the year round, the under secretaries and most of the clerks continuing to reside there in winter as well as in summer, although his excellency the viceroy and the chiefs of the various Government departments now leave Simla for Delhi in November and return to Simla in May. Simla will always be the summer capital of India, and in fact the capital for the greater part of the year, as well as being a permanent military headquarters for India. All of the offices of the Government of India at Calcutta have been vacated with several exceptions, including chiefly the Commercial Intelligence Department. It is proposed shortly that this department will have two offices—one at Calcutta and the other at Bombay, while the Department of

Commerce and Industries will be located at Delhi in winter and Simla in summer.

The general style of architecture of the new capital will be that which formerly prevailed at Delhi under the old Mogul dynasties,

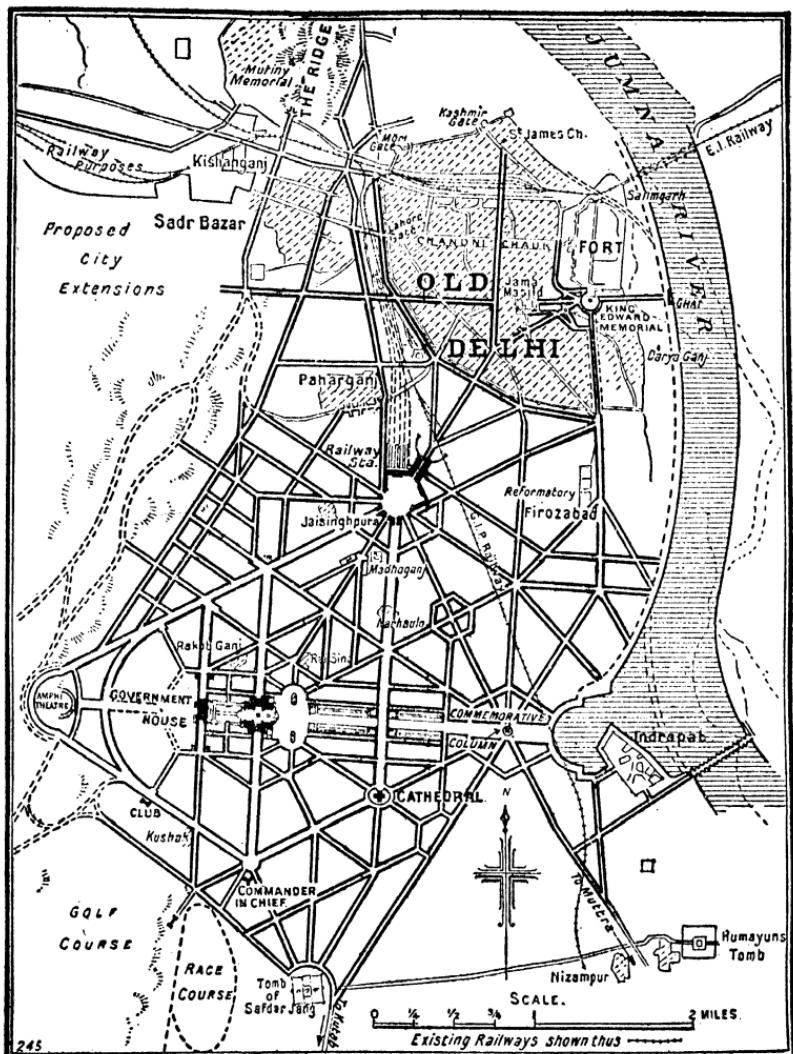


FIG. 6.—Site of the new capital of India.

with certain modern improvements as may be deemed desirable. American architects or manufacturers who may desire to study in detail the general town-planning features of Delhi may obtain printed copies of the tentative scheme, by writing to the Secretary of the Home Department of the India Government at Simla or at Delhi.

IMPROVEMENTS TO AND CONGESTION IN OLD DELHI.

The construction of the new capital just outside the old city of Delhi will probably necessitate some material improvements in the old city, in the erection of new bazars and business buildings, new residences, and in the general sanitary improvement of the city, which at present is subject to malaria, plague, and other diseases, and in summer is considered decidedly unhealthful. There has been an uncomfortable strain placed on the whole city, every available building being occupied by the incoming inhabitants. As for tradesmen and others, they suffer from lack of suitable business quarters and from exorbitant enhancement of rents by landlords.

There will also have to be increased hotel accommodation to take care of the increased number of visitors who may come to the city on official business. It may be remarked that Delhi is flat, and that owing to the considerable distances which people must travel to get about, motor cars will probably be largely used in future, and I understand that some will be specially furnished to persons in charge of the work of construction. The city is very hot in summer and only moderately cool in winter, so that a light airy construction will be generally adopted.

LATE DEVELOPMENTS.

The Delhi correspondent of the Advocate of India, Bombay, in a letter to his paper dated April 9, 1914, thus sums up the progress of work on the new capital:

It is now more than two years since the announcement of the Delhi changes. The first of these two years was occupied by the town planners in preliminaries and in the building, to the north of the existing Delhi, of the kutcha Delhi in which the Government of India has made its headquarters temporarily. Up to 12 months ago the site of the new capital, which is to the south, had not been settled within a good many miles. Up to six months ago the site, though selected, was practically untouched. Now money is being poured into it at the rate of something like half a lakh (\$16,666) of rupees per day, and although it is still true that not a brick has yet been laid in connection with any of the big permanent public buildings, a very great deal has been done in other ways.

The visitor of to-day finds the place a dusty ant's nest of coolies. Raisina Hill has been cut down to a plateau, a few humps only remaining to be removed. Leveling operations are in progress elsewhere. Light railways for the conveyance of materials have been laid down over the plain in lines a few hundred yards from one another. Well-made main roads radiate in all directions from the center at Raisina, with connecting ways in every stage of construction joining these roads at intervals.

Substantial coolie lines of thatch and mud have been constructed; and there is a large and well-laid-out camp where the public works department engineers have settled themselves down in tents, which should be speedily exchanged for more efficient protection against the heat. Everything is well ordered, and signs of careful management are to be found alike in the locomotive repairing shops, the brick kilns, and the quarries which have been opened, and in the electric arrangements which will provide power later on for cranes and construction tram lines.

To obtain the most impressive view of the site one must approach it along the wide avenue leading to it from Indrapat. One is then faced by the Raisina Plateau, which will eventually be crowned with a mass of imposing buildings. The designs for these buildings are not yet finally settled, but it is pretty certain that the structures will be partly of white Gwalior stone and partly of the red sandstone of which Shahjehan made such effective use. The style will probably be a kind of Palladian-Renaissance with domes and pillars. The main buildings will be in three blocks, forming a kind of triangle with each other, but sufficiently near together to give the impression from a distance of one great whole. The apex of the triangle where Government House will stand will be away from Indrapat. The wide avenue from Indrapat will climb

up to a square, in front of Government House, passing on the way between enormous buildings in similar style, in which Government offices will be located. The houses of the members of the council will be in the plain, on either side of the avenue.

HYDROELECTRIC PLANS FOR SUPPLYING DELHI.

[From the London Times.]

A concession for 12 miles of the upper Jumna River has been granted to Sir John Hewett, in the name of the Secretary of State for India, in order to provide for electric lighting, tramways, etc., in Delhi, the new capital of India.

Estimates have been made for a supply of 5,300 kilowatts at Delhi to begin with, but with a full development of the capabilities of the river it is calculated that ultimately over 18,000 kilowatts will be available. The system proposed, namely, a series of installations, as demand may require, but all of considerable size, resembles the exploitation of the Romanche, near Grenoble, France. Weirs are thrown across the river and the required intake of water passed through galleries tunneled in the cliffs, until the site selected for the power house is reached, where the penstocks will be erected. The same water is again dammed by another weir and utilized in turn in the same manner. Thus on the Romanche and its tributary, the Eau d'Olle, in a length of river bed of 21 miles from Le Peage to Le Rivier, eight weirs, with their accessory galleries and works, may be counted. On the upper Jumna it is possible in a length of 12 miles of river bed to exploit at least five installations—at Jalanta, Siuri, Lohari, Silon, and Hathiar.

Although along the river bed the distance from Delhi may be roughly estimated at 180 miles, a transmission line to convey the current would be only 140 miles in length.

ROADS AND STREETS.

GENERAL IMPROVEMENTS AT BOMBAY.

The Times of India, published at Bombay, states that road under repair, tramway tracks being broken up, and old buildings being demolished to make room for new structures are striking features of the scene in Bombay to-day, even apart from the special operations of the Improvement Trust in this direction, for the whole city is passing through a transitional stage, and a determined and comprehensive campaign has been set in motion to improve Bombay in every direction where changes are desirable and practicable.

It seems fully recognized by the municipality that the roads in Bombay have never been laid strong enough for modern heavy traffic. The general unsatisfactory state of the thoroughfares everywhere, the manner in which the streets are continually breaking up in places, and the inconvenience and annoyance caused by the clouds of dust which are almost continuously rising from the broken surface of the roads are the obvious results. The corporation intends to attack the problem of better roads in earnest.

The main thoroughfares will be dealt with first, and then, as time and money allow, similar improvements will be carried out on all the other streets. The scheme has not progressed sufficiently to determine what methods will be employed in the improvement scheme, but it is most likely that the roads will be remade with tarred macadam. In some instances tarred macadam has already been used in the Bombay streets, but it has not been laid in sufficient depth, and it is claimed that by introducing a better method a much stronger foundation can be obtained. The dust nuisance will be greatly minimized by this method.

PROVISION FOR LAYING MAINS—ROAD MACHINERY.

While the necessity of improving the roads in Bombay has been recognized for some time, consideration has had to be given to the fact that for some years past the roads have had to be continually broken up from time to time to carry out underground works of various kinds and it is only now, when this work is being brought to a close, that the roads can be made permanently with the knowledge that they will not have to be frequently disturbed in order that telephone wires, etc., may be laid down. During the past year, for instance, 40 miles of streets were taken up therefor.

In connection with this road scheme steps are being taken by the corporation to introduce improvements in the machinery employed for road work. Breaking up roads is done by manual labor, a slow process, and it is proposed to break up the roads by special machines, which will do the work better and more expeditiously. Another improvement will be carried out in the direction of concentrating all the underground pipes, etc., now dotted all over the road, in one chan-

nel at the side of the road, so that when it is necessary to repair them the main surface of the road will not have to be broken and the consequent inconvenience to traffic will be removed.

DUST PREVENTION.

Dust prevention has received considerable attention from the municipal authorities of Bombay, who have been prompted by repeated complaints from the public press and elsewhere to find suitable means for coping with the street dust nuisance.

As there is practically no rain in Bombay from the end of the monsoon in September until the beginning of the next monsoon the following June, the extremely dry conditions during this period favor the accumulation and blowing about of dust, which not only is insanitary and annoying but also does considerable damage to furniture, fabrics, etc. A large number of roads in Bombay have practically no paving, and many others are so imperfectly made as to dissolve easily into dust. Considerable improvements are being effected by strengthening roads with heavy "metal" coatings, and by providing rubblestone bottoming on the main thoroughfares. Tarring of roads is also being largely carried on, about 1,775,000 square feet having been thus treated during 1913 at a cost of about \$20,000.

Largely owing to the scarcity of water in Bombay just previous to the monsoons, the municipal authorities are disinclined to use water liberally for street sprinkling, and in February, 1913, mainly in order to economize in the use of water for roads, \$14,000 was sanctioned by the corporation to purchase a dust preventive known as Akonia. In reply to a letter from me asking information concerning this preparation, the municipal commissioner of Bombay has written me as follows:

This preparation was introduced about 11 years ago and has been used extensively throughout England with apparently favorable results. The first experiments made with this composition took place in Wembley and Harrow, and were so satisfactory that the surveyor of the former has treated his roads with it through the succeeding seasons.

Akonia was introduced in Bombay on the occasion of the King's visit, in the year 1911, and has been used since then every year with satisfactory results. This powder has hygroscopic effect. It absorbs moisture from the atmosphere and practically renews its dust-arresting properties. Roads are treated with Akonia once in 15 days, and, as it has a cumulative effect, a weaker solution is used on each subsequent occasion. In order to make the preparation more effective, roads are watered once during the two applications of Akonia.

The cost of Akonia in Bombay, delivered in docks, is Rs. 50 (\$9.73) per ton; 300 hundredweight (33,600) pounds of powder mixed in water and applied in ordinary road watering carts will coat 1,000 square yards of the road surface and subsequent applications will require about half the quantity.

The streets of Bombay are swept by coolies, who use a primitive broom, often made merely of twigs or branches tied together. In sweeping the dust-covered streets the effect is usually only to remove the dust partially. After sweeping, a portion of the dust is found raised in the air, while a large portion is still left on the street, looking as if it has been combed, remaining in furrows. I asked the municipal commissioner of Bombay if he would like to experiment with American machines or motors for absorbing the dust on the vacuum principle. He replied that he had already ordered a motor vacuum sweeping machine, but that he would be glad if I would favor him with any further information from America.

ROAD MIRRORS.

The municipality of Bombay has decided to use road mirrors at dangerous turns or junctions of streets or roads where there is considerable traffic, the idea being that drivers will be able to see on approaching such junctions whether streets are free from traffic or not. The *Bombay Times* says, concerning this plan of road mirrors:

While this will be the first road mirror introduced in India it does not take the form of an experiment, as road mirrors exist in many towns in England and they have fulfilled their object with distinct success. But Bombay is going further than England in that, as far as is known, the mirror to be provided at the corner of Gandevi Road and Hughes Road will be the biggest road mirror in the world. The most common sized mirror employed at home is $2\frac{1}{2}$ by 3 feet and the biggest one is 8 by 3 feet, while the mirror to be erected in Bombay will be 10 by 5 feet. The completion of the mirror will be awaited by motorists and others with interest, for in many parts of Bombay there are dangerous corners, and if they can be freed from their danger by the provision of road mirrors a difficult problem will be overcome.

ROAD CONSTRUCTION IN BURMA.

[By Consul Maxwell K. Moorhead, Rangoon.]

The intention of the Government is to spend approximately \$1,000,000 per year over a period of 10 years in improvements of roads in Burma. The existing roads will be properly metaled, permanent steel and masonry bridges will be substituted for the present timber bridges, feeder roads along the railway and river will be constructed, and the present roads will be linked up. In Tenasserim, from Moulmein to Victoria Point, a trunk road will be constructed, supplemented by feeder roads.

By carrying out this program Burma would possess, in addition to the 1,673 miles of metaled roads already existing which would be brought up to a first-class standard, about 1,100 miles of main routes extending northward from Rangoon to Shwebo and southward from Moulmein to Victoria Point. There would also be an additional 2,000 miles of feeder roads. When completed the Province would possess a total of 2,800 miles of first-class roads, bridged and metaled, and 8,000 miles of cart road and bridle paths. This work will probably be performed by the Public Works Department. The average cost for the construction of a first-class road, bridged and metaled, is estimated at \$6,000 to \$7,000 per mile.

This proposal must first be passed by the Burma Legislative Council and then approved by the Government of India and the Secretary of State.

STIMULATION TO MACHINERY TRADE.

The construction of these roads will induce a great expansion in the mining industry of Tavoy, Tenasserim division, and there should be increased demands for American mining machinery. The Public Works Department will also need a considerable amount of road-building machinery and supplies, but preference will be given to Indian and British made goods, as this is a Government undertaking. With the linking up of existing roads and construction of new roads there should be an increased demand for automobiles and commercial and large passenger cars.

PRESENT ROADS OF BURMA.

According to the revenue secretary to the Government of Burma there are in Burma 1,527 miles of railway, 1,673 miles of metaled roads, and 5,497 miles of unmetaled roads, for the most part mere village cart roads and bridle paths, over an area of 168,573 square miles and for a population of 10,500,000, excluding the Shan States. In the Federated Malay States, with an area of one-sixth that of Burma and a population less than one-tenth as large, there are more miles of metaled roads than in Burma. In all Burma there are only a little over 100 miles of roads which are capable of bearing the strain of motor traffic. With a few exceptions the metal of the roads consists mainly of burnt clay, pebbles, laterite, and local stone, and deteriorates rapidly under even moderately heavy traffic. None of these metaled roads are over 10 feet wide, and 90 per cent of the bridges are constructed of wood.

On account of the lack of funds no new metaled roads have been constructed in the Province during the past two years, and the appropriations available for maintenance have been so small that many roads have fallen into bad repair. The existing roads are mostly scattered all over the country without connection with each other, each road apparently having been built to meet local demands without consideration of the requirements of the Province as a whole. The utility of the railroad is impaired by the lack of feeder roads connecting the various villages. There are large sections of the country which on account of lack of roads have no outlet for their produce either to the railway or rivers.

PROCURING FUNDS FOR GOOD ROADS.

In the Tennasserim division there is said to be good land suitable for rubber cultivation, and the existence of rich deposits of tin and wolfram (tungsten) has been confirmed by the Geological Survey. The development of rubber plantations and of the mining industry is retarded by lack of communications. The Government of Burma has long been considering road improvement, but the lack of provincial funds has made any large expenditure impossible. In 1910 the Government of India was asked to appropriate out of imperial funds 40 lakhs of rupees (\$1,297,320) annually for five years in order to enable the Province to make up these deficiencies in means of communication in Burma. This request having been definitely refused, it is now proposed to raise the necessary funds by a special tax on the exportation of rice for 10 years, the rate proposed being 4 annas (8 cents) per bag of 224 pounds on rice exported to India and 1 anna (2 cents) on rice to foreign countries. This tax would be in addition to the existing export duty of 3 annas (6 cents) per maund (82 $\frac{1}{2}$ pounds) on rice exported to foreign countries. This tax, it is estimated, would produce annually an average amount of \$1,031,208, of which \$735,887 would be contributed by exports to India and \$295,321 by exports to foreign countries.

REBUILDING CITY STREETS.

During 1912 a special committee was appointed by the municipal council to inquire into the reason for the poor condition of roads in Rangoon. The chief engineer made an examination of most of the principal thoroughfares. Trial holes were opened up which revealed the fact that in a great many cases there exist no road bottoming at all below the surface metaling except occasional layers of 2-inch bricks. The chief engineer reported that practically every street in Rangoon should be taken up and relaid with proper foundations.

The surfacing materials used and suggested for use on Rangoon streets are as follows: Ordinary water-bound macadam, ordinary tarred, compressed asphalt, granite setts, and hardwood blocks.

In 1903 a portion of Merchant Street was laid with Val de Travers asphalt 2 inches thick on a foundation composed of 6 inches of cement-stone concrete. No repairs have been necessary during the 12 years since this road was laid and it is expected to last another 9 years. This has been the most successful road ever laid in Rangoon. The wooden blocks now in use have shown a tendency to expand and contract and have not preserved a true and even surface, being liable to blister after heavy rains. The macadam roads already in existence have been unsatisfactory, due probably to lack of good foundation and difficulty of surface drainage in a low-lying town like Rangoon, where the streets become flooded during the rainy season.

The city council decided to expend during a period of 10 years approximately \$3,000,000 in placing the roads of Rangoon in good condition, and a contract was let for compressed asphalt surfaces on a foundation of 9 inches of cement-stone concrete for several thoroughfares in the heart of the city.

STREET LIGHTING.

The municipality of Bombay has decided to make practical tests of the relative merits of gas and electricity for street lighting. The city is lighted partly by oil lamps and partly by gas lamps. There are many complaints of inadequate lighting of some of the streets, especially those where oil lamps are used. The experiments will demonstrate the comparative possibilities of the two methods of illumination by gas and by electricity under practically identical conditions. In certain cases experiments will be conducted side by side in the same street, so as to render comparisons easy. The commissioner of the municipality has arranged with the Bombay Electric Supply & Tramways Co. and the Bombay Gas Co. to carry out experiments with the following standards of light:

Width of streets.	Candle-power.	Distance from lamp to lamp.	Arrangement of lamps.
100 feet.....	1,500	240	
80 feet.....	1,000	200	
60 feet.....	160	120	Stagger.
40 feet.....	80	100	Line of curb.

The two companies interested in gas and electricity, respectively, are prepared to undertake the installation at their own risk and cost, provided that if their installation is eventually accepted the municipality will make due payment for it, and also enter into lighting contracts for a period of at least 15 years.

HIGH-PRESSURE LIGHTING.

Indian Industries and Power (issue of July, 1914), Bombay, gives the following information with reference to the possibility of high-pressure lighting in Bombay:

We may mention that with reference to the improvement of street lighting in Bombay, we understand that the Bombay Gas Co. has taken in hand the laying of high-pressure mains and fittings, and that the compressing plant is at present on its way out from England; this, with a view to demonstrate the most modern and up-to-date methods of street lighting by high-pressure gas, which is now very largely used in London, Paris, Berlin, and other large cities. In this connection it may be mentioned that both the gas company and Bombay Electric Tramway Co. have commenced preparation for the demonstrations which are to be held in different parts of Bombay in connection with the renewal of the lighting contract for Bombay, and the exhibition of high-pressure gas side by side with clusters of filament lamps should make quite a brave show. As we have already said, both gas and electricity have their partisans in Bombay, and the fight for the contract will be watched with considerable interest.

ELECTRIC LIGHTING IN KARACHI.

Relating to the progress of city lighting in Karachi, a recent issue of the *Bombay Times* says:

Public lighting with electricity seems to be going ahead in India. Bombay is just embarking on a big experimental scheme, and now we note that Karachi is already underway in the same direction. The Karachi Electric Supply Corporation has been demonstrating what can be done with electricity, with a view to showing the excellence of that system. A temporary line was rigged up for the occasion. Of recent years the public lighting of Karachi has been greatly improved by the introduction of a large number of high-pressure petroleum and petrol lamps of high illuminating power, and it is said locally to be a question whether electric lighting will be an improvement on these. There are not many cities in India which have such advantages for the generation of electricity as Bombay has in the cheap water which exists in its vicinity.

FIRE-FIGHTING SERVICES AND EQUIPMENT.

COTTON FIRES IN BOMBAY.

In view of the enormous losses by fires in India, especially by the cotton fires in Bombay, and the general state of apprehension as to the mysterious causes and the possibility of further costly disasters, the important business interests in this country would probably be receptive to the larger use of fire-protection equipment. The time thus seems opportune for an active campaign by American manufacturers of such goods to extend the sale of their wares in India.

Almost every day there has been a fire among cotton bales stored in this city, causing more or less damage. From March 23 to April 15, in 1914, exactly 22 cotton fires occurred in Bombay. On April 6 a fire destroyed about \$500,000 worth of cotton, which was second in point of destructiveness to the conflagration of March 24, which caused the loss of about \$2,500,000 worth of cotton. The total losses in Bombay City alone in cotton fires during the present shipping season amount to over \$3,500,000. Two hundred soldiers patrol the district in Bombay where cotton is stored, as well as many policemen and private watchmen, and yet, notwithstanding such constant vigilance, fresh fires occur almost daily, with causes unexplained. The situation causes great alarm among the cotton trade and fire insurance companies which have risks in Bombay.

MAY LEAD TO WIDER USE OF AUTOMATIC SPRINKLING DEVICES.

The prevalence of these cotton fires at Bombay will probably lead to greater effort to store cotton in warehouses, which may be properly equipped with fire-protection apparatus. American automatic sprinkling devices are already used to an important extent in the best equipped mills and warehouses, and have been so successful in checking fires that the Bombay Fire Insurance Association makes a reduction of 50 per cent in premiums on cotton in mills equipped with this apparatus, and 30 per cent in the case of godowns or warehouses.

There has been an epidemic of fires in other parts of India as well as Bombay, the cities of Calcutta, Lahore, and Simla having been visited by especially destructive conflagrations, causing the loss of goods valued at some hundreds of thousands of dollars.

APPLIANCES IN KOLAR GOLD MINES.

In view of the large amount of timber used in the Kolar gold mines for supports, considerable attention is given to equipment for dealing with outbreaks of fire. The general scheme followed involves the installation of water pipes, hydrants, and hose connections in all the principal shafts. Fire hydrants are installed at the shaft top and connected with the water supply, and where the pressure is insufficient pumps have been installed. At the various levels hose connections

are provided and small portable chemical fire extinguishers are kept in readiness. The question of rescue appliances for enabling men to enter a place charged with injurious gases has received considerable attention. The mining board will be glad to be apprised as to any improvements or developments in life-saving apparatus.

MOTOR FIRE ENGINES.

[By Consul Edward J. Norton, Bombay.]

During the last five years the use of motor fire engines has been making considerable headway in India, and apparatus of this kind is now to be found at Calcutta, Bombay, Madras, Delhi, Lucknow, Allahabad, Hyderabad, Rangoon, Bassein, and Moulmein. The Bombay fire brigade possesses 11 motor machines, all of Merryweather (British) manufacture, and the last three of these have been lately delivered. They comprise a motor "Fire King" steam fire engine of 400 gallons per minute capacity and two petrol "Hastfield" fire engines, each of a capacity of 450 gallons per minute, with arrangements for carrying a fire escape. These new machines are similar to others already in use, but with latest up-to-date improvements. A motor "Fire King" of 400 gallons capacity per minute has also just been acquired by the Hyderabad fire brigade, and included in its equipment is a petroleum heater, by means of which steam can be maintained in the boiler of the engine in order to secure a quick turnout.

MOTOR VEHICLES AND BICYCLES.

AUTOMOBILES IN INDIA.

There is no branch of trade in India in which American manufacturers have made more encouraging progress in recent years than in motor cars. The prospects for increased business are bright, in view of the success and popularity which American cars in this country already enjoy.

The statistics of export to India of cars from different countries for the year 1913-14 are as follows:

Motor cars.....	\$3,680,875	Motor wagons—Continued.	
United Kingdom.....	2,685,118	United States.....	\$21,326
United States.....	682,337	Germany.....	21,773
Germany.....	95,422	Belgium.....	6,653
Belgium.....	182,377	France.....	4,915
France.....	1,87,502	Austria-Hungary.....	8,906
Italy.....	9,389	Switzerland.....	6,288
Austria-Hungary.....	10,735	Parts and accessories.....	761,257
Motor cycles.....	346,490	United Kingdom.....	569,035
United Kingdom.....	335,457	United States.....	46,626
United States.....	2,409	Germany.....	47,867
Germany.....	2,710	Belgium.....	30,030
Belgium.....	1,399	France.....	49,419
France.....	1,134	Austria-Hungary.....	1,304
Motor wagons.....	185,165	Total.....	4,973,767
United Kingdom.....	115,307		

Motor cars are now extensively used throughout India. In Calcutta about 2,000 motor cars are registered and in Bombay about 1,000. The cars are of various makes, but the cheap class of car predominates. There is keen competition between English and American manufacturers. While English cars retain a popular position for touring purposes, American cars are in better favor for use in and around different cities and towns, being cheaper and more serviceable. One American car holds the long-distance speed record of India, having made the trip of 1,470 miles between Bombay and Calcutta in 79½ hours.

MOST SUITABLE CONSTRUCTION.

The kind of car suitable for India would easily lend itself to tropical conditions. Any car suitable for use in India should be fitted with a large petrol tank and ample radiator. Detachable wheels, preferably wire, are a desideratum. Wood gives place to metal for body work. A ground clearance of at least 8 inches is essential. Cars of 20 horsepower are as a rule most suitable. The equipment of the car for India should comprise a folding hood and wind screen, two spare wheels fitted with tires, a good handy tool kit, a strong luggage grid, an assortment of spare parts for the chassis, a waterproof canvas cover answering the double purpose of enveloping the car at night and acting in emergencies as a tent.

Sea air, combined with the stuffiness of a ship's hold, have a deleterious effect on the paintwork and bright parts of a car, and packers should safeguard owners against trouble of this kind.

The best-known makes of cars are represented by agencies in India, and as cars are sold at and sometimes below the actual maker's price, plus cost of importation, the purchaser's selection may be decided upon on arrival in India. It is customary for purchasers to intrust the clearing, unpacking, and testing of cars imported to firms catering for this business in India.

DETAILS OF PREFERENCES IN CARS.

There is only a limited demand at present for small two-seated cars, but this demand is rapidly growing. In general, a 44-inch tread and 80-inch wheel base would be suitable for Indian roads, but sufficient clearance would be required underneath to clear any obstacle such as a large stone. Some small cars sent out to India have been unsalable through having too low clearance.

The duty on cars and parts is 5 per cent, which is figured by taking 5 per cent of the c. i. f. and c. value. Registration taxes and municipal taxes usually have to be paid, but usually do not amount to over \$5 each. Gasoline in India costs about 33 cents per gallon.

It is practically impossible to sell cars in India with the left-hand drive, right-hand steering being compulsory in most districts. The use of brass ware painted black is an unattractive feature of American cars from the Indian standpoint. Owners of cars much prefer that all brass ware should be left the color of brass, especially as the labor cost of keeping the brass ware bright is not sufficient to be of any practical importance. Many owners of American cars in India, while, generally speaking, well satisfied with their cars, think that a little more attention might be bestowed on making the bodies look more attractive, even if this involves somewhat higher prices for the cars.

The native nobility and princes of India are large purchasers of motor cars, sometimes owning dozens of them. Many of them are fond of sporting models, say, 40 horsepower and able to do 80 miles an hour. The following description of a car purchased by Her Highness the Begum of Bhopal, may be of interest: It is a 6-cylinder 50-horsepower saloon limousine. The exterior is painted in Parma violet, the interior being upholstered in Dublin woven tapestry to match. The car seats seven people with comfort, the interior being fitted with revolving settee chairs and rear seat. A rich curtain of silk to match the general decoration scheme can be drawn behind the driving seat in order to secure privacy when required.

TAXICABS AND CYCLE CARS.

Taxicabs are in popular use in both Bombay and Calcutta, although, strictly speaking, they are not taxicabs but secondhand cars of any sort which are hired out. After the Durbar at Delhi a great many very handsome cars, which were imported especially for this occasion, were afterwards put on the market as secondhand cars and are now largely used as taxicabs. The fares are low, being only about double that of horse carriages.

There is a small demand for cycle cars, owing to the public being of the opinion that tires are not sufficiently strong for ordinary rough usage to which they are subjected. It is generally considered that in another year's time there will be an extensive trade in these

machines. Motor cycles are extensively used by persons whose incomes hardly warrant purchase of motor cars. Side-car attachments are popular. The postal service of India uses a great number of these cars for delivering letters in outlying districts. Such cars are always painted red, the official color of India.

All correspondence with Indian firms concerning motor cars should be in English. It is difficult to place agencies in India for a car except by the representative of the manufacturer calling personally and demonstrating the car to the dealers.

MOTOR-VEHICLE OWNERS IN BOMBAY.

The Times of India Directory for 1914, published in Bombay, shows that there are at present approximately 3,000 motor-vehicle owners registered within the Bombay Presidency.

MOTOR VEHICLES IN SOUTH INDIA.

As an instance of the recognition given in southern India to the great advantage in using motor vehicles for rapid transport, the government of the prosperous State of Mysore has announced a scheme of making advances of money or salary to its employees for the purchase of either motor cars or motor cycles. The new scheme will make it easy for the higher-salaried officials to purchase motor cars and for employees of lower salaries to purchase motor cycles. For the purchase of motor cars a grant of \$1,334 is to be given, or four months' extra salary, whichever is the lower, and for the purchase of motor cycles and side cars a grant will be allowed of \$500, or four months' salary, whichever is the lower. In either case the money thus advanced is to be repaid to the government in 36 monthly installments without interest. The loan will be secured by a mortgage which the government will hold on the motor car or motor cycle purchased. Thus the motor vehicle can be put to use at once, but the expense will not have to be entirely met for three years.

PURPOSE OF PLAN—NUMBER OF POSSIBLE PURCHASERS.

The government of this Native State of Mysore, which is next to Hyderabad as regards population, area, and general importance among the independent Native States of India, is noted for its progressiveness, and in initiating this plan of encouraging the use of motor vehicles among its employees it has been actuated by a desire to increase the efficiency of the public service, and especially to make it easier for the government officials to go to and from their work with little loss of time and to attend to official services outside their offices with greater celerity. The fact also that such motor vehicles may provide the opportunity for wholesome recreation outside of working hours, and also may make it possible for government employees to live at longer distances from their work, where rent may be cheaper and better homes obtainable, has furnished another motive to the government for the adoption of this interesting scheme. Of course the purchase of a motor car or motor cycle will depend upon the amount of the employee's salary, as an advance can not be obtained for an amount larger than the total salary for three years. There are

over 1,000 persons on the Mysore government civil list, most of whom draw salaries which will readily permit them to take advantage of the government's plan for granting loans for the purchase of motor vehicles.

I understand that there is already a great number of applications by Mysore government officials to obtain the advances necessary to equip themselves with motor vehicles. I am also told that the governments of other States of India are now considering the same plan, and that its widespread adoption throughout India is a possibility of the future.

FAVORABLE CONDITIONS FOR USE OF MOTOR CARS.

General conditions throughout South India are highly favorable for rapidly developing trade in motor cars and motor cycles. The roads in the vicinity of the leading cities are excellent, and in the country districts they average up as well, if not better, than in the United States. Most of South India, except on the Neilgherry Hills and the Eastern and Western Ghats, is either level or only mildly undulating, so that the roads are mostly broad and easy and safe to traverse. Moreover, other methods of getting about the country than by motor vehicles require considerable waste of time. The train service is slow and infrequent, and many suburban localities of large populations are not reached at all in this way. Rickshaws are much used for transportation, and considering that they are drawn by human power their efficiency for going even such distances as 30 miles is remarkable; still they are not nearly so fast as motor vehicles, especially when any uphill work is required. Moreover, in some towns, especially in Madras, there is considerable social prejudice against their use, Europeans and the more well-to-do natives considering that horse carriages, or still better, motor vehicles, are more in keeping with their personal dignity. Horse carriages are somewhat pretentious in appearance, and nearly always have, besides the coachman, one or two "syces" or footmen for the sake of style. They are usually drawn by horses which have been sold by the army authorities as being too old and slow for military work, though many persons owning their own conveyances often import a better class of horses from Australia.

CONDITIONS IN MADRAS VERY FAVORABLE TO USE OF MOTOR CARS.

Madras, the largest city of South India, about $8\frac{1}{2}$ miles long and $3\frac{1}{2}$ miles wide, with an actual area of 27 square miles, and some 300 miles of macadamized streets and roads, affords an extremely good example of the advantages of motor vehicles. This is certainly a city of magnificent distances, as one soon learns when attempting to get about. The city includes military parade grounds, parks, golf courses, and tennis grounds, and more or less of such space nearly always has to be crossed in going anywhere about the city. The leading hotels and clubs are located near one end of the city, the leading shops are on a long road (the Mount Road), and the banks, wholesale business houses, and wharves are scattered about some distance away in another section of the city. On account of the long time it would take to get to their homes or clubs or to hotels and

restaurants, most of the business men of Madras have their lunches every day at their own offices. Madras has a tramcar service, but very few localities are conveniently reached this way, and this service, moreover, is utilized almost entirely by the lower classes of the native population.

CONDITIONS IN MYSORE AND PONDICHERRY.

Bangalore, the leading city of Mysore, is similar to Madras in the difficulty of getting about conveniently and quickly, the hotels and leading residences being separated from the business district by large areas given up to grounds for parade and maneuvering of troops, golf and race courses, etc. This city's new tramway is about to be put in operation, and an effort is to be made to popularize its use by the well-to-do classes by dividing the cars into compartments for first and second class passengers, instead of having facilities for only one class, as at Madras; but it seems hardly likely that even then the trams will detract from the rapidly growing use and popularity of motor vehicles. I am not aware that in any other cities of South India there are any tramway systems, and in many towns, unless one walks, the only means of getting from place to place is by bullock carts. In Pondicherry, the capital of the French possessions in India, located several hundred miles south of Madras, there is a curious system of locomotion by "pousse-pousses," which are like bath chairs, and are not drawn but are pushed by one or two men from behind while a person in front steers with a rather awkwardly arranged lever. If not careful, he is likely to have a collision or upset the vehicle. In this French colony the use of bicycles and motor cycles is increasing rapidly, but probably not over 15 motor cars are owned there.

AMERICAN MOTOR VEHICLES ON SOUTH INDIAN MARKET.

There are about seven different makes of American motor cars and one American motor cycle on the South Indian market. The American car which has been most extensively advertised here sells for \$950, including lamps, hood, and wind screen. The cheaper types of American cars are so well advertised and promoted here through agents who fully recognize their selling merits that it is needless to comment further on them, except to suggest that American manufacturers should be careful to keep their agencies well stocked with parts and perhaps to send out occasionally expert mechanics to instruct the native workmen and chauffeurs how to meet promptly any mechanical difficulties which may occur. For operating many cars in India, especially those traversing long distances, two men are in charge of the car, the chauffeur and an assistant who ordinarily sits on the side step and is expected to do most of the laborious work of replacing tires, etc.

POSSIBLE OPENING FOR HIGH-PRICED CARS—DESCRIPTION OF ORNATE CAR SOLD.

It would seem that American high-priced cars, especially limousines, ought also to be represented in the South Indian trade, although of course to a more limited extent. In a population of over 65,000,000

there must certainly be a number of individuals, especially among the successful merchant class and native aristocracy, who could buy such cars if the superior qualities of these vehicles were made known. Cars intended for the ladies of Mohammedan and high-caste Hindu communities should be so constructed that they may be readily closed in by curtains.

For the information of American manufacturers of high-grade cars who might like to do business with some of the native potentates of India, who are generous purchasers of such cars, the following description of a car that was imported from England for the use of the ruler of the largest Native State in India is given: It has a 40 to 50 horsepower, six-cylinder chassis, detachable wheels, and groove tires. The rear part of the body is raised, giving a higher seat for the Nizam, and the back cushion is fitted with double folding arm rests, which when down afford an extremely comfortable armchair seat in the center. There are also in the interior of the car four small collapsible seats for the officials of his highness. The "celestial" or domed roof is finished with silver beading and bordered with silver fender plating of fleur-de-lis pattern. The ornamentation on the top of the domed roof is a silver "cap of maintenance," an emblem of local significance, which adds to the dignity of the car's appearance.

It is interesting to note that the total weight of the body, including canopy, cap of maintenance, wind screen, wings, platform steps, and all the coachwork, is under 940 pounds. The painting is of a rich canary yellow, with gold mountings, the upholstery being in old-gold silk brocade, with silk laces to match; also silk curtains in old gold are fitted on either side of the Nizam's seat. The car is fitted with an electric lighting system, the lamps of which are all silver plated. The Nizam's coat of arms is painted on the side and back panels, completing a most luxurious equipage.

SALE OF MOTOR CYCLES—SIDE CARS VERY POPULAR.

With reference to the sale of American motor cycles in this market, local dealers have informed me that American manufacturers should not send red cycles to India, the red color of the one American car now offered here having greatly interfered with its sale and offsetting other special advantages, such as the fact that it is unusually well sprung. These cycles should be either black, blue, or slate color. Red in India is the color of official service, and persons in red uniform in the service of the Government who might be using motor cycles do not seem to wish their cycles to match their clothing, nor do persons not in the public service wish to ride cycles of a color which might suggest that they are postmen or policemen.

Side cars for motor cycles are much used in southern India, especially by Europeans, who like to have such provision for taking their wives or children out with them; in fact, it is doubtful if motor cycles would have much sale here without such provision for side cars. As most of the motor cycles in use are of English manufacture, it might be well for American manufacturers to follow the English patterns for side-car equipment and attachment, as dealers already stocked with English side cars would not then be prejudiced against American cycles because of the difficulty of fitting these side cars to them.

SMALL MARKET FOR MOTOR WAGONS.

With regard to motor wagons for transporting freight, there is not such urgent need for them in southern India as in Ceylon. There is a good deal of rinderpest and foot-and-mouth disease among the bullocks used for freight transportation in southern India, but these animals are usually easy to obtain here, and they are also of exceptionally good breeds, especially those from Mysore, which have not lost any of the reputation which they won a hundred years ago when they were of invaluable service to the Duke of Wellington during his campaign in South India. During the Peninsular War the duke is said to have expressed regret many times that he did not have the services of Mysore cattle for transporting his supplies. It is evident, however, that these animals at their best are not as valuable for practical use as motor wagons, and it seems possible that leading business firms and large planters in southern India may in the future decide to use the latter, though it is probable that the small native farmers, who conduct most of the agriculture of the country, will always continue to use bullock teams.

It is understood that a considerable number of motor wagons are now in use in Bombay, but so far in Madras only a small beginning has been made by one firm. Elephants are used in Mysore for carrying exceptionally heavy loads, as, for instance, in transporting water-power machinery from the nearest railway depot, about 20 miles, to the Cauvery Falls transmission station. In the new installation, however, which is soon to take place, the elephant is to be retired from service for such work in favor of specially constructed trucks to be drawn by traction engines.

AMERICAN CARS IN MADRAS.

[By Consul José de Olivares, Madras.]

With the aid of local trade lists supplied by the consulate to manufacturers and exporters in the United States, and in a number of instances through the cooperation of traveling representatives specially sent out to investigate this field, seven new agencies for American motor cars, in addition to the one previously located here, and two agencies for American motor cycles have been established in Madras since July, 1911.

The business done by these agencies has in every instance greatly exceeded the expectations of the firms creating and accepting them. In a personal canvass of all the local dealers in motor vehicles on March 25, 1913, I ascertained that up to that date 158 American motor cars, including seven different makes, and 12 American motor cycles of two different makes, had been sold in this consular district, besides which 36 motor cars and 12 motor cycles had been ordered from the United States.

It is a testimony to the local preference for American motor vehicles that every agent for such machines in Madras assured me that cars imported from the United States are sold as fast as they are received, and in not a few instances sales are effected in advance of their arrival.

GROWTH OF IMPORTS FROM UNITED STATES—MOST POPULAR TYPES.

The relative volume of imports of American motor vehicles as compared with that of other nations materially increased in 1912. In the fiscal year ended March 31, 1914, the total importation of motor vehicles into the Madras Presidency from all countries amounted to \$636,670, against \$434,943 in 1913.

The total number of motor cars imported from all countries into the Presidency in the fiscal year ended March 31, 1914, was 465, of which 285 were British made and 163 American made. Motor cycles to the number of 310 were received from all countries, 288 of which were supplied by the United Kingdom.

The types of American motor cars which are filling the popular demand in southern India are the 25 to 30 horsepower, 4-cylinder, torpedo-model, touring cars, seating five persons, and retailing in the United States at \$850 to \$1,500. There is little demand in this consular district for the high-priced touring car, and the roadster type of automobile has yet to be popularized.

Motor vehicles are retailed in Madras both on a cash basis and on the installment plan. Terms of payment are, in a majority of cases, arranged to suit the convenience of the purchaser. Motor cars retailing here at \$1,230 are offered, under favorable conditions, on a first payment of \$162, with 11 consecutive monthly payments of \$97, and 5 per cent interest on the deferred payments. This plan enables many persons to acquire motor vehicles who could not buy for cash.

IMPORTANCE OF ADEQUATE PACKING—FIELD FOR MOTOR CYCLES.

Local importers have called the attention of this consulate to the fact that in some instances the packing cases in which motor cars are shipped from the United States are not constructed to withstand the strain of the long journey to India with the necessary transhipments, so that cars are sometimes injured in transit. To insure safety to such shipments, the boards used in the exterior construction of the packing cases should be firmly nailed to a substantial framework of 2-inch studding, with adequate interior cross bracing of the same material.

There are excellent opportunities for introducing American motor cycles into this consular district. While two American agencies have been established in Madras, the representation is by no means commensurate with the possibilities of the market. Local dealers say that the extensive sale of American motor cycles in southern India has thus far been retarded by the difficulty of keeping up adequate stocks of accessories and parts.

The motor cycles most popular in Madras are the kind which retail in the United States at \$175 to \$250. If American motor-cycle manufacturers would offer inducements to local importers to push the American machines and carry ample stocks of accessories and parts, it is believed that a large share of the present business in those vehicles would be diverted to the United States.

AMERICAN AUTOMOBILES IN BURMA.

[By Consul Maxwell K. Moorhead, Rangoon.]

American automobiles have become firmly established in Burma. During the year ended March 31, 1914, the United States supplied 149 automobiles, valued at \$120,350, against 57, valued at \$49,740, during the preceding year. The United States also sent 14 commercial cars, valued at \$19,080. These light commercial vehicles are used by the Rangoon post office to deliver mail to the branch offices, by the Burma railways for their parcel deliveries, and by a few of the retail stores.

The United Kingdom sent 106 automobiles, valued at \$141,210, 233 motor cycles, valued at \$52,640, and parts, \$62,190. All other countries furnished only 11 automobiles, valued at \$13,480, and 10 motor cycles, valued at \$2,110. These statistics, however, do not give full credit to imports from the United States. Quite a number of American automobiles are purchased in England and recorded as imports therefrom. Also about 25 motor cycles were shipped into Burma from the London agency of a well-known American manufacturer.

TAXICAB SERVICE—POPULAR TYPES.

In April, 1914, G. MacKenzie & Co. established a motor taxicab system in Rangoon—25 four-passenger American cars (Hupmobile) were placed on the streets, 25 additional cars have been ordered, and if the system is successful 50 more American cars will be needed. The rate is 16 cents a mile.

On account of the bad roads in Burma, touring is impossible. The streets of Rangoon, while greatly improved during the past year, are still, except in the business section, rough and badly paved. The expensive touring car has little demand. Twenty-horsepower four-cylinder, four or five passenger cars are the most popular, selling from \$800 to \$2,500 retail. Few runabouts are used. Cars with left-hand steering and control can not be sold in Burma. A few British-made cycle cars were recently imported. The demand for this type of car is not great at present, but may increase as the cars become better known.

Automobiles and component parts imported into Burma are dutiable at 5 per cent ad valorem. Motor cars designed to carry goods are free.

MOTOR TRUCKS.

Business circles in India are manifesting increasing interest in the possibility of extensively using motor trucks, wagons, or lorries for commercial transport over short distances where slow-going bullock carts are now mostly used.

TRANSPORT BY MOTOR TRUCKS AS CHEAP AS BY BULLOCK CARTS.

Although it has been a common belief in India that the bullock-cart mode of transport is the cheapest possible under the circumstances, recent experiments with motor trucks have shown that motor transport is really much cheaper. For instance, in Bombay, where a vast amount of cotton has to be handled every year, it is a

common sight to see on the streets a string of about 30 bullock carts, each drawn by 2 oxen and loaded with 3 or 4 bales of cotton. Taking 4 bales as a maximum load, it is obvious that it requires 30 men, 30 carts, and 60 bullocks to move 120 bales of cotton, and it takes them 1 hour to cover 3 miles, the approximate cost being \$9.73 for the trip. The same number of bales could be carried in 5 motor lorries, at a cost of \$1.60 per car, or \$8 in all, and the time occupied would be 15 minutes. Besides this saving in time and in cost of transport, there also would be a great saving in wages. Allowing a driver and one assistant for each commercial motor vehicle, it would be necessary to pay the wages of only 10 men for a quarter of an hour, instead of 30 men for a full hour, thus adding at least another \$1.60 to the economic advantage possessed by the motor vehicle over the bullock cart for transport purposes.

USE OF MOTOR TRUCKS IN CONNECTION WITH RAILWAY SERVICE.

Moreover it is now recognized that in India there is a great field for motor transport in connection with railways. There are many small towns in India where the cost of laying down a railway is out of all proportion to the immediate return likely to be received for the expenditure. For distances up to 100 miles and loads up to 5 tons, it can easily be seen that an enormous economy in time and in expenditure would result from the use of motor traction. The units being so much smaller than those of a freight train, there would be a minimum of difficulty in regularly finding full loads for the vehicles, and a properly organized system could be so arranged that the running of unladen vehicles on the return journey would be reduced to a minimum. In this connection an economic conference, which was held in the State of Mysore in June, 1913, under the auspices of the Government of this progressive Native State, passed a resolution declaring that:

In the opinion of this conference it may be possible to introduce motor-traction services for passengers and goods on some of the important routes in the State, and that the Committee of Industries and Commerce be requested to consider the subject and place their report on it before the next session of the conference, such report to include (a) particulars of routes on which such a service may prove remunerative, with traffic statistics, (b) particulars of vehicle service recommended, and (c) mode of organizing and financing.

USE AS PRELIMINARY TO LIGHT RAILWAYS.

In response to this resolution, Mr. Alfred Chatterton, Director of Industries and Commerce of the Mysore government, has prepared a bulletin on the subject of Feeder Railways and Motor Transport. In this bulletin Mr. Chatterton gives a list of some of the more promising routes on which motor cars might be experimentally tried, and also suggests several branch railways which might be operated in conjunction with a motor-car service. Mr. Chatterton says in this bulletin:

Motor tractors with a short train of wagons taking loads of 10 to 20 tons can easily compete with bullock carts when the latter have to be hired, but there must be sufficient work to keep them regularly employed. To insure this, out agencies working with the railways will have to be established and goods received at and consigned to these agencies. This means establishing warehouses and goods yards. The longer the route the more certainty there is of being able to compete against the country

cart at the outset. The steady miscellaneous traffic going on all the year will be at first all that can be dealt with, but by combining the services along a number of routes under one administration, it will be possible by transfer of motor vehicles from one route to another and by holding a reserve of carrying capacity to deal with seasonal traffic to some extent. Bearing in mind that the main object of these motor-transport projects will be to prepare the way for railways, it will be easy to determine along what roads they should be first established.

In an undulating country like Mysore, light railways can hardly be expected to cost less than \$10,000 a mile, which means that for a line 30 miles long the capital required will be \$300,000. For \$16,666 a service of motor cars carrying 50 to 60 passengers each way per day can be provided, and if effectually maintained they will soon test the demand for improved means of communication. Further, if kept running for a year or two, they will create traffic, and even if they no more than pay their expenses they will prove an economical prelude to light railways. For heavy-goods traffic the cost of mechanical road traction will involve a somewhat heavier outlay, but the result will be worth it. Either they will prove the case for a railway and contribute to the success of same, or they will demonstrate that the prospects of traffic are not sufficient to justify going on with a railway scheme.

Regarding the employment of motor vehicles as a preliminary to railways and assigning to them the function of preparing the way for a more costly permanent improvement in methods of transport, and regarding as a matter of secondary importance, but by no means neglecting this aspect, the prospects of immediate profit, it seems obvious that the Government should undertake this establishment of regular motor services. A central administration with central workshops for repair work that can not be done in the running sheds will prove much cheaper and more efficient than a number of separate motor-vehicle companies scattered over the State. The efforts that have been made so far by private enterprise have met with no success, and the starting of motor services unless under favorable conditions is to be deprecated as likely to bring the movement into discredit.

It is not proposed in this note to discuss technical details. Special inquiries will have to be made, as designs of vehicles are by no means stereotyped. All that can now be said with advantage is that for passenger traffic the vehicles should be propelled by internal-combustion engines, while it is an open question whether steam or petrol should be the source of motive power in vehicles of the heavier type and much slower speed suitable for the transport of goods.

MERCHANDISE TONNAGE MOVED FROM INTERIOR POINTS.

In view of the attention lately given in the daily press of India to the commercial motors, and in consequence of the interesting statements made in Mr. Chatterton's bulletin, a recent issue of the Indian Trade Journal, an official publication of the Government of India, gives a list showing the quantity of merchandise moved by rail and river from internal blocks in India where it is thought that a motor service could conveniently carry the available tonnage. For some of the most important Provinces, the quantity in tons of merchandise exported from such blocks in 1911-12 was as follows:

Provinces.	Tons.	Provinces.	Tons.
Bengal.....	24,129,597	Bombay Presidency.....	3,022,102
Eastern Bengal and Assam.....	2,352,583	Madras Presidency.....	4,449,547
United Provinces of Agra and Oudh.....	3,383,066	Rajputana and Central India.....	981,655
Punjab.....	3,063,202	Nizams Territory.....	192,752
Sind and British Baluchistan.....	923,816	Mysore.....	192,752
Central Provinces and Berar.....	1,737,887	Kashmir.....	79,310

DISCUSSION OF INDIAN MOTOR TRANSPORT AT IMPERIAL CONFERENCE.

At an Imperial Motor Transport Conference in London, at which there was appointed a permanent committee to deal with motor-traction matters within the British Empire, the prospects in India for the manufacturers of commercial vehicles were clearly placed

before the meeting by representatives of the Ceylon Chamber of Commerce and the Upper India Chamber of Commerce at Cawnpore. The delegate from Ceylon explained that 3,000,000 ton-miles of tea transport by motor trucks was urgently required. He mentioned one instance in which it took seven months to carry some fertilizer 40 miles from the railroad to a particular state in Ceylon. The delegate from Upper India stated that if the right sort of motor vehicle were introduced, an enormous demand would follow. He mentioned that what was desired was a vehicle suitable for transporting cotton, cotton yarn, piece goods, grain, etc., within the limits of towns, but not upon main roads between towns. Such goods at present are carried about in two-wheeled carts drawn by bullocks, and in some cases by men and bullocks combined, with an average speed of about 1½ miles an hour.

The Indian Office in London was also represented at this conference by Col. R. H. Ewart, who showed to what an immense extent the Indian army would benefit by introducing motor transport. He estimated that one 2-ton motor lorry could do in 10 days the transport work which would occupy six bullock carts for 80 days. He mentioned that by using motor lorries there could be an extremely important reduction in the length of transport columns, and also that one man in charge of a motor lorry could take the place of 35 men in charge of a bullock-cart train. He suggested that the army department of India in the near future would probably purchase a few motor vehicles for experiment.

MOTORS FOR INDIAN MAIL SERVICE.

It has been announced that among improvements contemplated by the Post Office Department in Bombay is the employment of motor lorries instead of horse-drawn vehicles for carrying mails. It is proposed to introduce about 12 motor lorries and do away with the existing vehicles. The motors will deal with mails between the docks and the post office, the carriage of mails to and from the railway stations, and generally replace the present means of transit, so that the mails can be handled with greater dispatch. Bombay will be the first city in India proper to be provided with motor lorries for the postal service, but they have already been introduced in Rangoon, where they have proved a great convenience.

The Director General of Posts and Telegraphs at Simla (W. Maxwell, Esq.), has purchased for the use of post offices in rural communities twenty side-car combination motor cycles. At first this experiment will be confined to 20 posts in various parts of the country, but it is expected that later a considerable fleet of these motor cycles will be put into use.

In an interview with the *Bombay Times* the Director General states:

The motor cycle has arrived at such a state of perfection that we think we are justified in generally adopting it. In any case it is considerably cheaper to run than the horse-drawn vehicle, and enables a much quicker service to be provided. Suitable precautions will be taken to provide against breakdowns.

USE OF TRUCKS IN BOMBAY.

One leading motor-car company in Bombay has been introducing commercial motor cars for a variety of purposes. These cars have

been fitted with large tanks for the conveyance of oil, petrol, water, etc. In addition to carrying goods, they have also been used as fire engines, omnibuses, trolleys, electric tramway tower wagons, etc. This firm has also supplied a fleet of motor vans for the Ameer of Afghanistan.

A prospectus has just been issued of another motor-car company, the Western Indian Transport Co. (Ltd.), with a capital stock of about \$115,000, the main object of which is to purchase and maintain a fleet of motor lorries suitable for carting large quantities of cotton and other merchandise to and from the docks to the various cotton mills and other works situated in the surrounding districts of Bombay city. It is intended to maintain a fleet of 20 to 25 motor lorries fitted with solid rubber tires. A site opposite the new Alexandra docks has been purchased for a garage, and a workshop is already in course of erection at a cost of about \$3,500. The company has already two motor lorries running for experimental purposes. The prospectus of the new company states:

Official statistics show that the volume of merchandise entering and leaving Bombay annually amounts to not less than 53,493,680 hundredweight, and that there are upward of 11,000 bullock carts now engaged in this transport trade, so that there is ample scope for the company to extend its operations at some future date. It is proposed to run the lorries on the unit system by which, as is well known, no van can be thrown out of use for any prolonged period, as practically every individual part can be replaced within a small space of time from the stock always available. The running expenses per mile per van should be 30 cents. Out of 21 vans, 18 should be running continuously, and 3 be kept at the garage for overhauling, each van working for about 25 days in a month at a rate of 30 miles per day per van; total mileage, 13,500 for 18 vans during the month.

Motor vans are being increasingly used by the health department of Bombay for disposing of city refuse.

MOTOR TRUCKS IN CALCUTTA.

In the city of Calcutta the movement in favor of commercial motor cars also appears to be gaining considerable headway. The "Englishman" of that city notes:

There are now a fairly large number of motor lorries used for transport business in Calcutta, and there is every prospect of a further increase in their number. From the point of view of speed, of course the bullock cart is not in it with the motor lorry and, according to expert calculation, even the question of cost is not so prohibitive a factor in the employment of mechanical traction when its advantages are also placed in the balance, as was believed at one time. Motor traction is only a trifle dearer than bullock traction, but the difference is more than made up by quickness and less risk of loss of goods by the new method of transportation.

A company is also now organized at Calcutta for the commercial transport business. The manager visited London, Paris, Berlin, and other cities of Europe, in order to become informed as to the best European methods of successfully conducting a business in the operation of commercial motors.

MOTOR BUSSES AND TRUCKS IN CALCUTTA.

[By Vice Consul General John Stuart Hunt, Calcutta.]

A representative of the London General Omnibus Co., of London, England, has organized the General Omnibus & Transport Co. of Calcutta to handle the merchandise transportation and street passem-

ger traffic of Calcutta. Of the \$2,500,000 capital stock, \$1,000,000 had already been subscribed in London, where it is intended to sell the remainder.

A service of about 100 motor busses and 400 motor lorries or trucks will be instituted. The busses will be single deckers and will be of three types—first, second, and third class. The motor lorries are intended to supplant the native oxcarts for moving the vast amount of incoming and outgoing freight at both the railway terminals and the shipping and landing docks. The oxcart can only legally and physically carry a small load and is very slow, while the motor lorry or truck will be able to transport large loads safely and more expeditiously, and thus relieve the more or less congested condition at the terminals and certain near-by streets, as well as be of material benefit to shippers and others in securing prompt delivery of their merchandise and, it is thought, at reduced cost.

As the present street railway system gives unsatisfactory service, and as the passenger transportation facilities of the motor busses will be continuous, fast, clean, and cheap, it is thought that the public will be materially benefited through the institution of an improved passenger transport service.

BICYCLES IN MADRAS.

[By Consul José de Olivares, Madras.]

The expansive area of the city of Madras and the inadequacy of its interurban tramcar system necessitate the use of an unusually large number of private conveyances of every description. The chief commercial district is separated from the European residential section by a system of esplanades and military reservations $2\frac{1}{2}$ miles in width. Added to this, Madras has 300 miles of macadamized streets and roadways, the excellence of which is surpassed nowhere.

OPPORTUNITY FOR AMERICAN BICYCLES—IMPORTS.

The same conditions which make for trade in motor cycles in Madras likewise result in a large local business in bicycles and their accessories. The bicycle is in use by all classes, embracing Europeans, Eurasians, and Indians.

Among the numerous makes of bicycles in use hereabouts, the majority of which are English, the following machines figure prominently: Singer, Rover, Gladiator, B. S. A., Humber, Triumph, Swift, Milford, James, Raleigh, Rudge-Whilworth, Starley, Minoru, and Component.

The prevailing retail prices of bicycles in this market range from \$18 to \$81, the most popular types being among the cheaper and intermediate grades. A large amount of the local retail business in bicycles is on the hire-purchase system.

It is believed that serviceable American-made bicycles which could be retailed here at \$20 to \$50 would find a good market in this district.

During the year ended March 31, 1914, the number of bicycles imported into the Madras Presidency was 4,763, and the value \$97,724; while the number for all of British India was 34,577, and the value \$620,172.

IRON AND STEEL GOODS.

TRADE IN IRON AND STEEL.

In connection with the iron and steel trade of India, which is quite important and expanding, there is constant evidence that American manufacturers might build up a business of considerable magnitude here if they would be willing to bring their prices down to the average levels of those of British, German, and Belgian manufacturers. In certain classes of products, such as galvanized sheets, it would appear that the largest proportion of the business in India might be obtained by American manufacturers if they would make concessions in their prices sufficient to compete properly with their rivals in other countries. There have been glaring instances of orders of very large amounts being turned down by American firms on account of their refusal to make concessions to Indian consumers sufficient to put their prices on the same basis as those of British manufacturers. There seems reason to presume that an immense amount of business in India after being solicited and practically obtained is eventually lost to the United States every year because of refusal to lower prices to a competing basis.

QUANTITIES IMPORTED.

The principal imports of iron and steel into India during 1913-14 from the leading countries supplying such material—the United Kingdom, Germany, Belgium, and the United States—were as follows:

Iron and steel.	United Kingdom.	Germany.	Belgium.	United States.
	Tons.	Tons.	Tons.	Tons.
Bars and channel.....	33,817	85,310	108,028	1,148
Beams, pillars, etc.....	56,178	21,554	9,817	368
Bolts and nuts.....	3,748	1,806	1,573	105
Hoops and strips.....	21,757	5,153	2,560	923
Nails, rivets, and washers.....	7,291	5,338	3,315	3,075
Pipes and fittings, cast.....	42,583	4,101	468	9,037
Rails, chairs, etc. (excluding those for railways).....	4,594	8,254	4,919	...
Sheets and plates, galvanized.....	274,759	909	456	1,450
Sheets, tinned.....	52,787	—	—	37
Sheets, not galvanized or tinned.....	38,894	40,563	19,319	1,628
Tubes and fittings, wrought.....	11,723	3,448	1,321	1,908
Angle and spring.....	17,038	14,299	12,316	521
Other.....	44,119	9,368	8,956	1,935
Total.....	609,286	200,103	173,048	22,035

PURCHASES FOR GOVERNMENT USE.

As over 7 per cent of India's total imports are of iron and steel goods, which represent also over 9 per cent of its total imports of manufactured articles, and as a large proportion of such imports are for the use of the Government of India itself, or local provincial gov-

ernments in connection with railways, bridges, irrigation works, buildings, etc., and as the Government regulations for the purchase of stores in India forbid purchase of iron and steel materials except from 40 specially authorized local firms, I wrote to each of these 40 firms to ascertain their attitude concerning American iron and steel goods.

REPLIES OF LOCAL FIRMS TO INQUIRIES.

Some of these firms replied that they were pushing the manufacturing part of their business and held no foreign agencies; others that there were no particular lines of American goods which they contemplated taking up, but that if they should later decide to do so they would be glad to communicate with the Bureau of Foreign and Domestic Commerce at Washington. A few other firms, including Martin & Co., T. E. Thomson & Co., Ahmety & Co., and Burn & Co., all of Calcutta, T. Cosser & Co., of Karachi, and the Empire Engineering Co. (Ltd.), of Cawnpore, reported that they had already done considerable business with the United States in iron and steel goods, and some of them said that they already had all the American agencies which at present they were in a position to handle. Two firms in Calcutta replied that any arrangements for business with the United States would have to be made through their London offices. (These two firms, with their London addresses, are as follows: Jessop & Co. (Ltd.), 156 Leadenhall Street, London, E. C., and Heatly & Gresham (Ltd.), 110 Cannon Street, London.)

A few firms replied decidedly to the effect that they would be interested in American articles of iron or steel manufacture and might under suitable conditions be glad to accept American agencies in certain lines.

HOW TO EXTEND TRADE.

There has been a good deal of complaint by American manufacturers, to the effect that the chief reason their sales in India make a poor showing as compared to those of British iron and steel manufacturers is that the Indian Government regulations practically restrict Government purchases of iron and steel material to the United Kingdom. There is considerable fallacy in such a view, although it is quite true that it is easier for British firms to get Government of India business than for American firms. But that it is possible for American iron and steel to be sold in India in connection with Government works is demonstrated from the fact that it is not at all uncommon for such material to be used under certain conditions. If the specially authorized firms have the American material already in stock, and local Government officials are satisfied with the same, there is usually no reason, except possibly the prices being too high, why such material might not be purchased instead of British material. The advantageous course for the American manufacturer to pursue regarding such business is to get into touch and pleasant understanding with such approved local dealers, and to encourage and assist them in every way possible to carry the American material in stock.

HOW DIFFICULTIES ARE OVERCOME.

One instance was recently called to my attention of the chief engineer of one of the local provincial governments being well pleased with the quality and type of an American steel pole brought to his attention, but he mentioned that the poles would have to be bought in England, since he was forbidden under the regulations to make purchase of such articles unless they happened to be already in stock in India. The agent of the American manufacturers, however, was able to overcome this difficulty as follows: He first secured the promise of the Government engineer that if such material should be kept in stock in India and always available for purchase that the particular material in question would have the preference in orders for public works. Then, armed with such favorable assurance, the agent of the American firm was easily able to persuade a reliable local firm that if it would carry this material in stock a profitable and permanent business in the same would surely eventuate. In other cases drawn to my attention, American firms, although not able to do a direct business with the Indian Government departments, nevertheless have been able to convince local engineers and other officials of the special desirability of their products in local conditions, so that such local officials have indented for the purchase of such products through the Store Department of the India Office at London.

THE MATTER OF CREDIT.

The subject of giving credit in India as circumstances may require is one also that fails of appropriate attention by American manufacturers of iron and steel. While it is very unwise indiscriminately to give credit in India, especially in dealing with native firms, nevertheless there are many important firms absolutely sound desiring credit, which ought to be granted to them within reason. In the Indian iron and steel trade liberal arrangements should be allowed with such firms as have been investigated and found to enjoy the confidence of local banks and of foreign firms which grant liberal credit. There are comparatively so few firms engaged in the iron and steel business in India that to obtain information as to their standing should not be difficult. As a matter of fact, most such firms, especially those approved to do business with the Government of India, are under English management and enjoy an excellent reputation.

To keep iron and steel equipment in stock, so as to be in a position to take immediate advantage of any orders which may come, especially emergency orders, requires considerable capital or credit, so that manufacturers' terms of sale should be liberal and helpful wherever the reputation of the local firm justifies it. There are several American firms now finding a fair market in India for such articles as rice hullers and cane-crushing machinery which might never have been able to do any business at all, except that they do not require local firms acting as their agents to pay for such machinery until they sell it.

DOMESTIC SUPPLY.

British India itself, in its Tata Iron & Steel Co. (Ltd.), with works at Sakchi, near Calcutta, is at present in a position to supply a fair amount of the country's requirements for iron and steel. In fact this company has even made shipments of its pig-iron product to San Francisco. This enterprise is the biggest industrial undertaking in India, but up to the present, although its pig-iron department appears to have been successful, yet the steel department has been worked at a loss. It is anticipated, however, that as a result of a visit which has just been paid to this company's works by Mr. Charles Page Perin, an American steel specialist and consulting engineer, remedial measures will be applied to cope with present difficulties, and, to quote from the recent report of this company, it was stated concerning this American engineer that "the directors confidently hope that his presence and guidance will insure the realization of all our expectations."

THE PITTSBURGH OF INDIA.

The works of the Tata Iron & Steel Co. (Ltd.) at Sakchi, now known as the "Pittsburgh of India," have cost about \$8,000,000, inclusive of purchase of mining rights, collieries, and building houses for the company's employees. The company started operations in August, 1907, but the construction and equipment were not entirely completed until the end of January, 1913. The company has a concession from the Government of India for the purchase by the State of 20,000 tons of steel rails annually for 10 years, subject to the condition that the rails comply with the Government specifications and that the prices be not more than the prices at which similar rails could be delivered c. i. f. if imported into India. It is also allowed a specially reduced rate on all materials, plant, and ores to its works on the local railways and also on all finished products and by-products dispatched for shipment from Calcutta. This company holds on lease, within reasonable distance of Sakchi, large deposits of high-grade iron ore in proximity to coal of a suitable coking character. Numerous analyses have proved this ore to contain on an average over 60 per cent of metallic iron. Orders for this company's product have come from all parts of Asia, and even from the United States, as already mentioned, but up to the present Japan is said to be the company's best foreign customer.

IRON AND STEEL IMPORTS AT BOMBAY.

The secretary of the Bombay Chamber of Commerce has prepared a special table of statistics showing the imports of iron and steel into Bombay during the official year ended March 31, 1914. This report may be of interest to iron and steel manufacturers in the United States as showing the large volume of iron and steel imports into Bombay and the very meager proportion of imports from the United States, which has held a poor fourth place in such business here.

The statistics of all classes of iron or steel goods imported into Bombay during the official year ended March 31, 1914, show 182,423 long tons from all countries, of which 125,188 tons came from Great

Britain, 42,311 from Germany, 8,624 from Belgium, 2,213 from the United States, and 4,087 from other countries, including 1,595 from Austria, 973 from Sweden, and 462 tons from Norway. The following table shows the imports in detail:

Articles.	United States.	Belgium.	Great Britain.	Germany.	Other countries.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Anchors and cables.			157		1	158
Beams, pillars, girders, and bridge work.	134	788	17,927	16,055	163	35,065
Bolts and nuts.	43	417	809	1,052	116	2,437
Hoops and strips.	919	597	10,140	3,005	128	14,789
Nails, rivets, and washers.	30	700	1,557	1,448	3,078	6,813
Old material for remanufacture.			1,881		62	1,943
Pipes and fittings, cast.	76	18	17,943	3,000	16	21,053
Rails, chains, and fishplates.			504	2,420		2,924
Screws.	67	23	166	33		289
Sheets and plates:						
Galvanized.		49	49,997	377		50,423
Tinned.	37	1	10,301			10,339
Not galvanized or tinned.		4,792	9,873	12,013		26,678
Tubes and fittings, wrought.	523	665	3,231	617		5,036
Wire.	384	328	330	787	521	2,350
Other manufactures of iron or steel.		248	392	1,504	2	2,226
Total.	2,213	8,624	125,188	42,311	4,087	182,423

REASONS FOR SMALL IMPORTS FROM UNITED STATES.

American iron and steel were not imported into Bombay to anything like the extent that similar goods from Great Britain, Germany, and Belgium were, principally because American iron and steel manufacturers were not willing to make the same concessions in prices to secure business as were their competitors in Europe, and because during the earlier part of the year the lack of reasonably quick shipping facilities to Bombay prevented any prompt execution of orders. It is understood that at present, with a decline in unfilled orders in the home market, American manufacturers are showing more disposition to lower prices to secure business here. Unfortunately, however, the iron and steel market in India itself is also now somewhat depressed, so that little business of any sort in these goods can be done here for the time being. It is nearly always the case that just previous to the monsoon there is a lull in the local demand for iron and steel. However, as soon as the monsoon arrives and is proved to be beneficial, business in India usually enjoys a period of renewed activity. With a good monsoon, business conditions in India in the iron and steel line should be favorable to a large import trade about August. The monsoon usually arrives in Bombay and western India between June 1 and June 15.

GROWING DEMAND FOR MACHINERY.

India's manufacturing industries are now showing a good expansion, and the demands for machinery and millwork of all kinds, including belting for machinery, in 1913-14 represented 6 per cent of the total value of imported articles wholly or mainly manufactured and 4.5 per cent of the imports of all merchandise. The total imports of machinery and millwork, including belting, in 1913-14 amounted to \$26,805,000. The chief machinery sold includes textile, electrical, and mining machinery, and machinery for aerated water making,

metal working, oil crushing, paper mills, ice factories, rice and flour mills, sawmills, boilers, jute pressing, machinery for the tea and sugar industries, and for other purposes of agricultural production.

How important a market still remains in India for the introduction of machinery and implements of a modern type is well brought out in an article recently published in the British Export Gazette:

Nowhere else on earth does a market exist possessing greater interest for manufacturing engineers than India offers, and nowhere else can be found a country so dependent on engineering skill and enterprise for its industrial development. The past half century has seen wonderful advances made, yet still the surface is but barely scratched. Side by side with a network of railways and giant irrigation schemes are to be found strangely primitive machinery and methods in most fields of manufacture and production. The ryot with his small farm plot and the handworker in the textile and metal industries persist in their millions, yet slowly and surely the oil and gas engine, the centrifugal pump, the power-driven grain mill, seed press, and sawmill, the sewing machine, the cotton-weaving loom, and similar machines and appliances are coming into wider use. Labor is overwhelmingly plentiful, there is abundance of capital in India if only it could be got into circulation, and the natural resources of the vast peninsula are beyond calculation. Further, the traditional conservatism of the people of India has already given way in many directions before the advance of Western ideas. Here, then, are all the potentialities of an enormously greater industrial market than the country already offers—though even now India buys twice as much from Great Britain as any other portion of the Empire—and the magician who will transform those potentialities into actualities is the engineer.

INDIA'S PRESENT INDUSTRIAL EQUIPMENT.

Much has already been accomplished, and existing industrial concerns, forming a substantial nucleus of the coming machinery market, include some 240 tea companies, 6 bone-crushing mills, 6 wool mills, 30 tanneries, 12 sugar factories, 10 sawmills, 8 paper mills, 10 roperies, 70 linseed and castor oil mills, 30 jute presses, 25 large flour mills, and double that number of small ones, 40 cotton presses, 20 iron foundries, 25 ice works, 20 breweries, 10 rum distilleries, 12 gold-mining companies, 55 coal companies, 147 cotton mills, 20 jute mills, several hundreds of printing presses, 6 mica works, etc.: and the number of these is increasing, for men who can command the necessary capital are generally ready to enter into competition with well-established concerns.

MUNICIPAL AND PRIVATE ENGINEERING ENTERPRISE.

The municipalities also offer business of considerable value to the wide-awake exporter, for they are in a position to place orders for electrical and waterworks machinery, steam rollers, and other kinds of plant and material. Various river steamer companies may be depended upon to indent on home engineering firms; steam tramways have found considerable favor with native and half-caste passengers, and even each up-country jute press has its launch, while the steam and electric driven launches which ply on the River Hooghly represent a very large outlay. Practically the whole of the business of the kinds enumerated goes to England. The Calcutta engineering works, as well as those at Bombay and Madras, also indent freely on British firms for their requirements, while the railway workshops throughout the country are equally liberal in following the same policy.

PLANTATION MACHINERY REQUIREMENTS.

Nor must the indigo planters be forgotten, for if the horizontal engine of obsolete mechanism and a few wooden screw presses are still to be found on some concerns, modern machinery does not fail in its appeal to the majority. Condemned boilers, bought for surprisingly few rupees and kept from bursting by a kuke, are certainly to be found in a good many factories, while the wooden presses are often so ramshackle that the wonder is that they can possibly hold together. Nevertheless, the indigo planters—and there are quite a number of them—who keep abreast of the times see to it that the possibility of a breakdown in the busy season is reduced to a minimum.

FALSE ECONOMIES EXPOSED.

With regard to condemned boilers and other machinery which old age has rendered dangerous, there are undoubtedly some cases in which accommodating factory inspec-

tors make things easy for the half-caste planter, who, frightened by the price demanded for a new engine and boiler, can not bring himself to part even with the lowest sum asked by a machinery merchant. Such a man, pinning his faith to an engine whose worn-out cylinder shakes with each movement of the piston rod and to a boiler which is within measurable distance of bursting point, is often only too ready to pay a ridiculously small figure for his requirements, and—well, propitiates the inspecting official if the latter prove amenable. When, however, an accident occurs, an inquiry is set on foot, with the result that there is a vacancy in the factory inspector's department, and if "willful neglect" is proven against the planter the last-named may find himself let in for the compensation claimed by his damaged employees. Needless to say, factory inspectors as a class are above suspicion in this respect, but exceptions exist.

SPECIALIZED SELLING ORGANIZATION LIMITED.

On the whole, however, slack methods and inefficient equipment are giving way before the newer spirit that is pervading industrialism in India, and certainly this is so in regard to the way that machinery of all kinds is merchanted in that market nowadays. Specialization is, of course, still limited, and it remains largely necessarily true that all is fish that comes to the net of the average Calcutta, Bombay, and Madras firm. The wine merchant is anxious to take an order for a disintegrator or an oil engine; the passenger agent is ready to supply a steamer with both passengers and propeller blades; the manager of a ropery takes up the sale of printing-press plant, and even tailors have been known to represent local importers of beer. Under the circumstances it is not surprising that the recognized resident agents of the home machinery manufacturers are up in arms against the interlopers and that they grudge having to pay a commission on orders which reach them through these sources—especially when they have been to the trouble and expense of introducing their goods into the country. Many, however, under the necessity of making the best of things, even go so far as to cultivate the "poacher," and sacrifice a part of their profit rather than forego an opportunity of doing business. Still, it is a bitter pill to have to swallow and leads to frequent disputes and ill feeling. The above remarks summarize some of the principal machinery requirements of this great market and suggest the wide range usually undertaken by importing firms.

MARKET FOR HIGH-PRESSURE BOILERS.

A leading machinery firm in Bombay expressed the opinion that American boilers could not be successful in India, because of the steel used not being of the quality required by Government testers. American manufacturers do not follow Indian specifications and offer open-hearth steel instead of basic steel. The market in India is for boilers built for high pressure. The steel should not be too hard, but somewhat flexible. German boilers have sold well in India because they are made of steel that expands well. Nearly all boilers used in India are of Lancashire type. This firm states that it imported a boiler from the United States about 15 years ago and still has it on hand, being unable to sell it. Boilers in India are mostly used for cotton mills, ginning factories, etc.

SEWING MACHINES.

[By Consul Edward J. Norton, Bombay.]

The demand for sewing machines in India has been steady for the last seven years, during which time 78,462 machines were imported. While of this total only 5,851 appear as imported direct from the United States, the direct imports from that country are believed to be considerably greater than official figures indicate. In 1913-14 the number imported from all countries was 11,848, of which the United Kingdom supplied 8,833, Germany 2,565, and the United States 77. However, most of those imported from the United Kingdom were made by an American firm that has factories in England.

Up to two years ago imported merchandise was largely credited to the country from which the goods proceeded without considering transshipment. This system has since been modified, and now the sources of imported merchandise are the countries from which the goods have come, whether by land and sea or by sea only, without interruption of transit save in the course of transshipment or transfer from one means of transit to another.

The hand-operated sewing machine is the most extensively used in India. Apart from cheapness it is particularly liked by the native people because of the simple mechanism. The plain table treadle machine is widely sold and the top head table and cabinet type are popular among the well-to-do class.

The manager of the largest sewing-machine agency in Bombay, a branch of a well-known American company, stated that while there is considerable competition of an intermittent character for the sewing-machine trade of India, the business of his district is steadily increasing. German and British competition in the sewing-machine trade is generally established with local dealers as a side line, while the American company through its own salesmen and branches sells sewing machines and nothing else. The fact that the American company sells more machines throughout India than all other makes combined is undoubtedly due to its widespread sale and distributing organization.

A notable increase is reported in the demand for sewing machines for making goods of heavy manufacture, especially for making clothes and stitching up tents, canvas or duck covers, tennis screens, mattress and blanket work, and for bookbinding. Machines adapted to leather work of various kinds are being widely used.

STEEL PIPES AND SHEET PILING.

PIPES FOR BOMBAY'S WATER SUPPLY.

It is anticipated that before the end of the year 1915 the city of Bombay will receive 50 million gallons of water every day as against the present daily supply of 30 million gallons, this increase being effected by the duplication of the present Tansa main bringing water to this city. This scheme, which is approaching completion, has a twofold importance. In addition to being one of the biggest water-supply projects carried out in India, it marks the first occasion on which huge steel pipes of the "lock-bar" type have been made in this country.

Early in 1912 the hydraulic engineer to the Bombay Corporation in a report estimated the requirements of the population at 51 million gallons per day, which could best be provided by constructing another Tansa main, as had long been proposed by the municipality. It was decided to carry out his scheme, and contracts totaling \$2,500,000 were let for constructing the main from the headworks of the water supply to Bombay and for raising the dam at Tansa. The work of laying the new main was simplified, owing to provision having been made in the bridges, culverts, siphon heads, and embankment at the time of construction of the works in 1890 for a second main, so that the actual pipe laying has become a comparatively straightforward task. The first work was widening the embankments and

the preparation of the bed for the new main. The contract for raising the dam, let to Pallonji Edalji & Son, of Bombay, for \$110,000, included building nearly one and one-half million cubic feet of masonry on top of the existing dam.

THE CONTRACTS AND THEIR PROMPT EXECUTION.

The northern portion of the new main for 19 miles will be composed of steel pipes of 50-inch bore and the southern portion of cast-iron pipes of 48-inch bore. The contract for iron pipes was let to Turner, Hoare & Co., of Bombay, at \$752,000. For constructing steel pipes a contract was let to Mephan, Ferguson & Sons, of Melbourne, Australia, at \$1,058,000, and they undertook their manufacture in Bombay.

The total length of the new Tansa main will be about 33 miles, and from the headworks of the water supply at Tansa to the outskirts of Bombay the main will run parallel with the existing chain of pipes which bring water to the city.

LOCAL MANUFACTURE OF THE PIPES.

The manufacture of the steel pipes was carried out in the city of Bombay through an interesting process. The pipes are made in 28-foot lengths or over twice as long as the pipes of which the present main is constructed, and are 50 inches internal diameter. These large pipes are manufactured with a minimum of labor and with the greatest of ease by heavy and powerful machinery in local works, in which every labor-saving appliance that the Australian manufacturers could devise was installed.

To follow one of the large steel sheets, which measure 28 feet long and 6 feet 7 inches wide, through the works illustrates the process of manufacture. The sheet was first lifted from the stack by a hydraulic crane and then passed through a set of rollers to take out any bends or buckles which it may have received in transit. After having been straightened it passed on to a large and powerful planing and upsetting machine. The next stage was bending this 28-foot long sheet to a half circle, and for this purpose a set of rollers specially designed to take this long length of plate were used. The next operation joins two of these long half circular trough-like sheets together to form a pipe, and this was where the lock-bar joint was used. This joint was made with a rolled steel bar 28 feet long. To form a pipe the sheets were first clamped firmly together with their thickened edges in the grooves of the lock bars.

A powerful hydraulic press next closed down the lock bars over the thickened edge of the plate. This press closed both bars at once by a mandril which supported the pipe inside while a ram came up from the bottom and squeezed the bars home in the tools or dies shaped specially for this purpose, the top die being supported by the casting of the press. The force exerted by this press was 450 tons at each stroke. The dies were about a foot long, a few inches only being done at a time, the pipe being moved through the machine until completed. A couple of hydraulic shearing machines then trimmed the pipe ends, and the pipe was then tested before receiving its protective coating. Each pipe was filled with water and tested

to 200 pounds per square inch, then rolled to and dipped into a steel tank full of a mixture of tar and Trinidad asphaltum, kept at a temperature of 350° F. by furnaces underneath. The pipe remained in this bath until it reached the same temperature as the bath itself, and was then hauled out and lowered into a revolving frame. While in this frame a strip of hessian cloth was laid on the revolving pipe, the hessian being wound up on the pipe spirally from end to end.

Next more of the mixture from the tar bath was spread on top of this hessian, thus thoroughly saturating it. A coating of sand was thrown on the pipe, and while the pipe was cooling any roughness in the coating was smoothed down with hand rollers. When cooled sufficiently for the coating to harden, the pipe was rolled away, ready to be taken away to be laid and jointed.

CONTRACTS FOR MATERIAL.

In connection with this new Tansa main, the only business which appears to have gone to the United States was the sale of about 40 tons of steel piling by the United States Steel Corporation. This piling was used in connection with the crossing of a small creek.

The Australian company which obtained the contract for the steel pipes in connection with this main, and which has been enterprising enough to erect its own plant in Bombay for the construction, will, it is anticipated, bid on future work of the same sort in India, and will always hereafter be an important factor in the international competition here in steel piping. As it receives over \$1,000,000 for the pipes supplied, it was apparently profitable to erect the local plant.

AMERICAN STEEL SHEET PILING.

American steel sheet piling is now being extensively used in India for supporting the sides of sewer trenches in place of the more usual wooden timbering for such purposes. Both the Madras and the Bombay municipal corporations have been using it in connection with new drainage schemes, and it is stated that 500 tons of the same have lately been ordered by the Public Works Department of the Central Provinces. It is said that this piling may also come into much larger use in the future in the building of bridge piers, coffer-dams, reservoir work, etc.

The engineering supplement of the Times of India, Bombay, describes the use of this piling in Madras and Bombay as follows:

In connection with the Madras drainage scheme, the special reason for using the sheet piling in the sewer trench is that at 14 $\frac{1}{2}$ feet below ground a black muddy subsoil is encountered. This is very difficult to excavate as it is fluid. As a matter of fact, it has been necessary to strap the bottom of the excavation down in order to make any progress at all. As the level of the mud inside the trench is lowered, very considerable load is produced on the timbering. It was possible to do the first 5 feet of excavation without timbering. The piles were then placed in position and afterwards kept driven down about 2 feet ahead of the excavation until the mud was reached, and into this the piling was driven to its available depth.

In the manhole the piling was driven about 7 feet into the mud before any serious attempt was made to remove the latter. No machinery has been used, and the whole of the piling has been driven in at first by a maul and afterwards by a heavy piece of timber used as a monkey.

In Bombay, where sewerage work is being carried out on a large scale, this steel piling has also been brought into use, the Bombay municipality having decided to make use of a similar quantity as the Madras corporation for exactly the same kind of work.

HARDWARE LINES.

The Department of Commercial Intelligence of the India Government has issued an interesting bulletin concerning India's hardware trade, the special object being to show the classes of hardware that were popular in this country, but the supplies of which are now stopped. It is mentioned that India's purchases of hardware from Germany have been of considerable and increasing importance, though less in value than the imports from the United Kingdom. Statistics show that the United States and Austria-Hungary competed rather closely for third place in the hardware trade of India. In 1912-13 Austria-Hungary was third and the United States fourth, but in 1913-14 the relative positions of the two countries were reversed. The improvement in American trade has been due chiefly to the successful introduction of American metal lamps.

IMPORTS BY PRINCIPAL COUNTRIES.

In the last two fiscal years India's imports of hardware, including cutlery, were valued:

Imported from—	1912-13	1913-14
United Kingdom.....	\$6,692,372	\$7,702,283
Germany.....	2,365,684	2,747,475
Austria-Hungary.....	1,074,757	1,092,388
United States.....	966,380	1,295,370
All other countries.....	718,985	890,739
Total.....	11,818,178	13,728,255

ENAMELED IRONWARE.

Enameled ironware is the most important line of foreign imports, since its use in place of the usual domestic articles of brass and copper has been making headway in this country, especially among Mohammedans. In 1913-14 the imports from Austria-Hungary were valued at \$606,473, from Germany \$199,794, and from the United Kingdom \$74,852. Austrian enameled ware, known as the "gun" brand (made by B. Furst, Vienna), was the best quality in the market. British enameled ware was slightly cheaper than Furst's "gun" brand, but the latter is preferred, owing to its superior shape and better polish. The most popular form of German enameled ware is the "Tally-ho" brand of soup plates.

Enameled ware is imported in three colors, viz, blue-white, white-white, and marble-white. The prices, which were the same for all colors, and descriptions are as detailed below:

Bowls.—These sold in sizes ranging from 5 to 28 centimeters (centimeter = 0.3937 inch) in diameter. The prices per dozen for No. 5 quality, Furst's "gun" brand, were: For the 5-centimeter size, \$0.22;

6-centimeter, \$0.24; 7-centimeter, \$0.26; 8-centimeter, \$0.28; 9-centimeter, \$0.30; 10-centimeter, \$0.34; 11-centimeter, \$0.38; 12-centimeter, \$0.40; 13-centimeter, \$0.48; 14-centimeter, \$0.54; 15-centimeter, \$0.58; 16-centimeter, \$0.66; 17-centimeter, \$0.72; 18-centimeter, \$0.80; 20-centimeter, \$1.06; 22-centimeter, \$1.12; 24-centimeter, \$1.20; 26-centimeter, \$1.34; 28-centimeter, \$1.46; all less 5 per cent discount.

Rice dishes.—These were sold by the piece as well as in sets of four assorted sizes, viz., 24, 26, 28, and 30 centimeters in diameter. The price of Furst's "gun" brand was \$0.98 per dozen of assorted sizes.

Soup plates.—The demand for Furst's "gun" brand soup plates was not so large as that for the cheaper German and Austrian makes. The "gun" brand soup plates are heavier and more substantial and cost about \$0.12 more per dozen. The German "Tallyho" brand, 26 centimeters, and the light Austrian soup plate, 26 centimeters, cost \$0.40 per dozen.

Tumblers.—Furst's "gun" brand high Indian tumblers were largely imported at the following rates per dozen: $\frac{1}{4}$ pint, \$0.36; $\frac{1}{2}$ pint, \$0.41; $\frac{3}{4}$ pint, \$0.50; $\frac{1}{2}$ pint, \$0.56; 1 pint, \$0.65.

Other articles of enameled ware, such as cups and saucers, kettles, teapots, and tiffin carriers were imported, but the bulk of the trade was done in the four kinds detailed above.

Some criticism of the wearing qualities of enameled iron utensils has been heard among those who would promote the wider use of brass wares in the household and thus work a revival of India's brass industry. It is claimed that after a time the enamel begins to chip off, and that when these particles get into the food they cause dangerous illness.

GERMAN CUTLERY.

A remarkable increase in the imports of German cutlery has taken place in the last few years (these advancing from \$286,598 in 1912-13 to \$400,440 in 1913-14), whereas in the same period imports from the United Kingdom have made relatively little progress (\$339,672 in 1912-13 and \$378,122 in 1913-14). There were several makes of cheap German penknives, scissors, and razors, but the qualities most in demand were made by Kaufmann, of Solingen.

Penknives.—The most popular quality of Kaufmann's penknives was No. 6636 $\frac{1}{2}$. The prices per dozen of the principal qualities were: Kaufmann's No. 6636 $\frac{1}{2}$, \$0.45, plus 4 per cent (1 $\frac{1}{2}$ per cent for commission and 2 $\frac{1}{2}$ per cent advance); Kaufmann's No. 932, \$0.50, plus 4 per cent; Kaufmann's first quality, with stag handles and straight points, \$0.68; Kaufmann's second quality, round pointed, with bone handles and with rings, \$0.56; Kaufmann's thin quality, No. 55, with bone handles, \$0.52; Carl Schleiper's, Solingen, No. 33, with wooden handle and with ring, \$0.62; Alois Schweiger's No. 2604, with bone handles and with ring, \$0.44. The penknives are placed in paper wrappers containing half a dozen, two such wrappers to a bundle.

Scissors.—A large business was done in Kaufmann's assorted scissors, which were put up in a neat folding box. The price was \$0.60 per dozen of assorted sizes, but they could also be obtained

separately if required. Kaufmann's No. 11344 pointed scissors competed against the well-known "Popular" scissors manufactured in Birmingham. The price of the German article was \$0.96 per gross, plus 4 per cent advance, whereas the price of the Birmingham scissors was \$1.02 per gross.

Razors.—German hollow-ground razors were in great demand in the market; the two principal qualities were Kaufmann's hollow-ground razors (cheaper quality) and No. 1186, "Hammer" brand, real hollow ground, each kind costing \$2.88 per dozen.

NATIVE-MADE CUTLERY—BUILDERS' HARDWARE.

Cutlery is manufactured in many parts of India. Calcutta, Bombay, Poona, for instance, all have their works. Wazirabad in the Punjab, Meerut (for scissors), and Burdwan (for pocket knives), are also well-known centers. In this industry, therefore, the Director of Commercial Intelligence states: India should be able to take advantage at once of the opening now created by the cessation of foreign imports. He mentions that it is essential, if the trade is to be firmly retained in Indian hands, that the best modern tools should be employed and every effort should be made to improve the standard of skilled labor. Among the exhibits at the sample exhibition at Calcutta in January were some good examples of Meerut scissors, which have a high reputation in all parts of the United Provinces for edge and durability.

Cheap padlocks were imported from the Continent in large quantities. The greatest demand was for a lock known as 5/0, which is of 2½-inch size. The principal kinds of imported locks included: Small padlock, No. 200, 1¼-inch size, \$0.86 per gross; medium size lock, No. 5/0, 2½-inch size, \$0.12½ per dozen; padlock with two keys, \$0.22 per dozen; common japanned padlock, small, \$0.20 per dozen; common japanned padlock, large, \$0.31 per dozen. Keys were imported in various sizes and shapes at prices ranging from \$0.05 per gross for the smallest size to about \$0.66 for the larger sizes. Key rings came largely from Austria, the kind most in demand being the medium size, costing \$0.24 per gross.

Imported hinges ranged in size from 1½ inches to 6 inches in length, a dozen pairs or pieces being packed in a box. The price was \$0.05½ per inch per dozen pairs or pieces.

The manufacture of locks and hinges is a well-established industry in India, and the class of article turned out can compete on equal terms with anything in the market. It is only in the very cheap and inferior lines that foreign competition is felt. Alighur is a famous center of lock manufacture in northern India, and representative samples of various classes of Alighur work were shown at the Calcutta sample exhibition.

SAFES AND MISCELLANEOUS HARDWARE.

Under the heading, "safes and strong boxes of metal," considerable imports were shown from the United Kingdom and also from Austria. This is a line in which Indian manufacturers have secured a high reputation, well-known firms that specialize in these articles being

established at Bombay and Calcutta. Prices of Furst's Austrian safes averaged from \$45.42 to \$64.88 for the cheaper varieties; more expensive varieties up to \$113.55 were also noted.

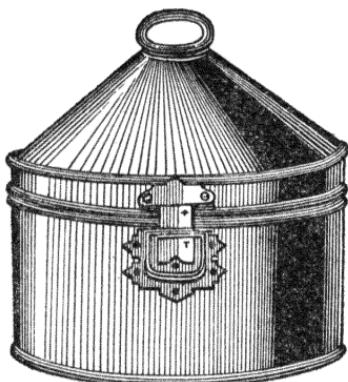


FIG. 7.—Box for tropical helmet.

Tin mirror boxes in different sizes, shapes, and colors, were imported in large quantities from the Continent. They were packed four boxes in a set and 25 gross boxes in a case. The price of plain colored round boxes was about \$0.88 per gross, and of fancy colored round boxes \$0.96 per gross.

Tin boxes were also largely imported, without mirrors. Round tin boxes in fancy colors cost about \$0.40 per gross; they were packed in sets of four and 25 gross boxes in a case. The price of round brassed tin boxes was about \$1.22 per gross, and nickelated tin boxes cost \$1.44 per gross.

Tin mirrors were also largely imported from Germany, round hand mirrors costing \$1.50 per gross and round Jubilee mirrors (in two sizes equally assorted) \$0.78 per gross.



FIG. 8.—The "Bombay" jewelry box.

SPOONS AND FORKS—LARGE TRADE IN NEEDLES.

Imported tin strainers with wooden handles cost \$1.62 per gross. Tin spoons came in the following classes: Long rice spoons, round and oval (assorted), at \$1.92 per gross; small rice spoons, round, at

\$1.32 per gross; and tin spoons in three small sizes equally assorted, at \$0.78 per gross.

Quotations on aluminum spoons and forks averaged, per gross, as follows: Teaspoons, \$1.40; dessert spoons and forks, \$2.22; table-

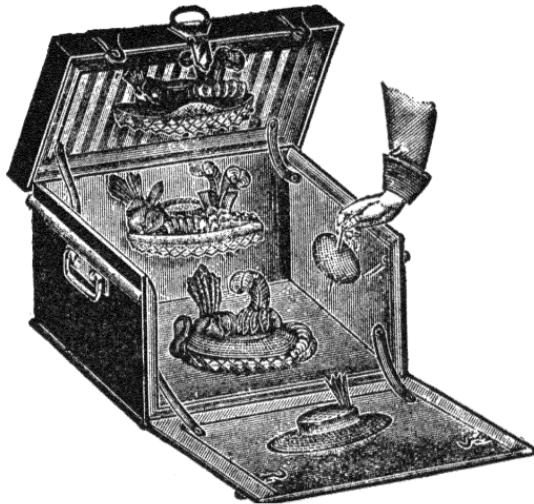


FIG. 9.—Lady's hat box.

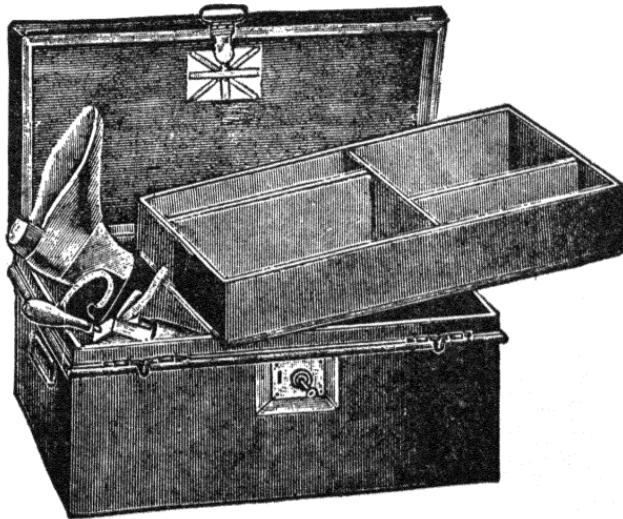


FIG. 10.—Army air-tight boot box.

spoons and forks, \$2.88; in all cases less 10 per cent discount. These were packed three dozen in a paper box.

There was a very large import of needles from the Continent, especially in the following classes:

Sewing needles, Capoteras, small size, Nos. 0-1 and 2, equally assorted, \$0.22 per tin of 2,400; sewing needles, Capoteras, large size, Nos. 2/0, 3/0, 4/0, and 5/0, equally assorted, \$0.53 per tin of 5,000; sewing needles, sharps, \$0.56 per tin of 5,000; darning needles, sizes Nos. 3, 3½, and 3¾, equally assorted, \$0.56 per tin of 2,400. The heaviest demand was for the large sizes of Capoteras needles. It is understood that some of the Indian woolen mills have hitherto made use of needles of German manufacture for certain classes of work.

GLASS KNOBS—WOOD SCREWS—IRON NAILS.

Glass knobs came principally in sizes of 1 inch to 2½ inches, 1 dozen being wrapped in a paper packet. The 1½ size is the most popular, costing \$3.48 per gross.

It is interesting to note that supplies of wood screws were obtained almost entirely from Birmingham. Screws are imported in assortments of one-half inch to 4 inches in length and of varying standard gauges. The price varies according to the nature of the assortments and gauges, as each size is made in different gauges. Machinery for making screws is very expensive and complicated and the industry could not be attempted without large capital. It is believed that Japan also imports all its supplies of screws from Birmingham.

Iron wire nails came largely from Germany and Belgium. Wire nails were packed in hundredweight (112-pound) casks and were sold in various assortments from 1 to 6 inches. Their average price was about \$2.04 per hundredweight. The prices for the assortments generally differed, in accordance with the proportions of smaller and larger sizes. Iron rose nails were usually imported from France and Sweden in hundredweight casks and sold in assortments of 1½ to 10 inches. Their average price was about \$3.12 per hundredweight.

WASHERS AND IRON WIRE—ZINC SHEETS.

A large trade was done in galvanized-iron washers of German and English manufacture. The German make was imported in 1-hundredweight iron casks and cost \$4.20 per hundredweight c. i. f.; the English article was sold in 7-pound packets in 1-hundredweight cases, at \$6.12 per hundredweight f. o. b. less 5 per cent discount for cash, which works out about \$6.30 per hundredweight c. i. f. The difference in price is accounted for by the better packing and superior quality of the English article.

The principal trade in iron wire was with England, but such wire was also largely imported from Germany and Austria. It was sold in assortments of Nos. 1 to 32 B. W. G., and the price varied according to assortments. The assortments generally ordered were Nos. 12 to 20, and the average price \$2.40 per hundredweight. It was shipped in 56-pound coils. Galvanized-iron wire was imported from Germany and Austria. The assortments were the same as for ordinary iron wire. The average price was \$2.88 per hundredweight. It was shipped in coils of 1 hundredweight.

Zinc sheets were imported from Germany and Belgium in standard sizes from No. 6 to No. 20 B. W. G., their price being \$100 per ton. They were packed in casks containing 5 hundredweight.

IRON BUCKETS AND BATHTUBS.

India appears to be a good market for enameled and galvanized ironware, especially buckets and pails, the use of which as substitutes for the distinctive Indian vessels of copper and brass, earthenware, and leather is increasing to an important extent. This is true also of aluminum ware.

The native copper and brass receptacles have curved sides and are designed so they may be easily carried on the head without upsetting or the contents being too easily spilled. It would, however, probably never pay to import into India metal receptacles of similar shapes, since they could not be nested into each other, and so would prove too bulky and the freight too high; hence receptacles imported must be in the form of buckets and pails which, nested together, could be delivered in India at a minimum of expense and sold at prices which might tempt purchase even by natives who dislike to change from the traditional use of brass and copper ware to which they have been accustomed from time immemorial. Probably the distinctive native vessels will always be especially cherished for carrying food and drinking water; still, for service in many ways, the imported buckets and pails, or the native-made imitations of the same, have the combined advantage of cheapness and utility to such an extent that their sales should steadily increase, especially in place of the native-made leather "kapile," or pump buckets, the manufacture of which is now rapidly declining.

SIMPLE BATHROOMS.

The European element in India makes a specially large use of imported buckets and pails. For instance, there are very few houses in India, except in Bombay and Calcutta, equipped with forced water supply and pipes and faucets for turning on water (at least not above the first floor). This means that all the water for one's bath must first be poured into galvanized-iron buckets or pails and brought into the bathroom by servants or coolies and then poured into the bathtub. The bathtub also is nearly always of galvanized iron, oval in shape, and after the bath the waste water is spilled over a part of the floor that is railed in to prevent flooding of the room and is covered with cement or galvanized iron. Escape of the waste water is effected by a hole in the wall at floor level leading to an outside drain. In some bungalows where the bathroom is on the ground floor and there is little or no natural drainage, or where coolie labor is considered almost as cheap as the force of gravity, the water after the bath is poured out from the bathtub into buckets and is then carried outside, often to be emptied near by, where it is apt to facilitate breeding of malarial mosquitoes. Leading hotels, even in some of the large cities, have no rooms above ground level and lack good drainage, so that waste water must be taken away in buckets.

Galvanized-iron bathtubs for use in India are usually of as light weight as possible and never attached to the room as a permanent fixture, as this would prevent their being easily tipped over to empty the contents or to be taken outside and scoured and allowed to dry under the germ-destroying power of the sun's rays, as many particular persons may demand. Some travelers in India, especially military officers, and others whose occupations involve considerable traveling,

prefer to carry their own bathtubs about with them. These usually are made of waterproof canvas with wooden supports and are easily portable.

LACK OF MODERN PLUMBING AND BATHING FACILITIES.

There can hardly be an important field in India for introducing American enameled or porcelain bathtubs of styles used in the United States until there is a widespread improvement in India in general methods of sanitation, water supply, etc., so that bathrooms in houses can then be constructed and equipped as in more advanced countries. India is even behind Ceylon in this respect, as in that island the best hotels, at least, have comfortable and sanitary bathing arrangements,

whereas in India common galvanized-iron bathtubs are the general rule, except in a few hotels in Bombay and Calcutta.

American visitors to India often receive a shock at the primitive bathroom facilities in leading hotels and residences. However, with a long stay in the country, one may get accustomed to existing arrangements and also find that such deficiencies as are noticed are made up to a great extent by the large number of servants provided for attending to necessary household work. For instance, in India a household may have as many as 15 servants, whereas a house in the United States of similar size and occupied by a person of similar status might have only 3 servants. In many houses of specially influential people in India who do considerable entertaining as many as 40 or



FIG. 11.—Lavatory for upcountry houses.

50 servants may be employed. These local servants, however, do not receive more than \$3.50 to \$16 per month; the latter wage is exceptional.

The poorer native classes in India do not use bathtubs at all, but wash themselves under public taps or faucets or out in the country wherever there may be any running water, ponds, lakes, etc. In the big cities like Bombay and Calcutta public bathing places are provided with huge troughs running through the center and with separate accommodations for men and women.

DEVICE FOR OBTAINING RUNNING WATER.

Running water is not obtainable for houses in India except in Calcutta and Bombay. In order to have running water in Indian bungalows where plumbing is not available, the device shown in figure 11 is being introduced. The tank at the top can easily be filled

by servants, being only about 5 feet from the floor. To start the water running, the faucet is pressed, and when washing is completed the plug chain is pulled. The basin is of heavy white porcelain, suspended by metal supports which hold it safely, even when the pedestal is removed for emptying. The cabinet is of oak, highly polished or with white enamel finish. A mirror is attached to the tank, which it conceals. The tank has a capacity sufficient to fill the basin about nine times.

SANITARY PAILS—FIRE BUCKETS—DOMESTIC WARE.

A special use in India for enameled and galvanized iron buckets is for closets, enameled for the use of the better classes of people and galvanized for the lower classes, there being no other toilet arrangements except in several large cities. For taking away night soil galvanized buckets are used, most of which can be sealed by the use of a few handfuls of earth and a little water. These are purchased in large quantities by local governments and municipalities.

There is considerable use in India of iron buckets in connection with wells and pumps, especially in big irrigation districts. Iron milk pails are also in common use, and also all kinds of galvanized and enameled iron cooking receptacles and dishes. Fire buckets, usually painted red and marked "Fire," and containing water for any emergency, are found in many of the larger buildings.

A great deal of rather low-grade enameled and galvanized ironware is now manufactured in India and sold at about 10 per cent cheaper than imported ware, but this does not seem to check the increasing sale of such imported ware, which has mostly been manufactured in Austria and Germany. In importing such articles from these countries quotations were usually furnished c. i. f., with 60 days' credit allowed, with interest.

IMPORT STATISTICS AND PRICES.

The increase in imports of enameled ironware into India is shown in the foreign trade statistics of the country. For instance, in 1910–11 the imports amounted to \$634,250 in value, in 1912–13, to \$948,174, and in 1913–14 to \$897,631.

There are no detailed statistics dealing with galvanized ironware, except in sheets and plates, but the general experience of the trade is that galvanized iron buckets, pails, etc., mostly from England, Germany, and Austria, are imported and sold in larger numbers every year.

Prices in India of enameled and galvanized-iron buckets and bathtubs, as given in a catalogue of a leading Calcutta hardware firm, are as follows: Galvanized iron buckets with strong hoop bottoms and riveted sides, 10 to 14 inches in diameter, 33 to 65 cents, and with seamed sides slightly less; galvanized-iron night-soil buckets and disinfectors about \$2.50 each, or about \$28 per dozen; galvanized-iron fire buckets painted red, about 65 cents each; pump buckets, 32 to 65 cents; enameled iron milk pails, capacity 2½ gallons, about \$1, and enameled iron milk cans with covers, holding 5½ pints, about 65 cents; enameled iron latrine pans or buckets, about 65 cents; white enameled toilet pails with wicker handles, \$2.50 for sizes most used; enameled

iron wash basins, 18 inches in diameter, about 70 cents; galvanized-iron bathtubs, about 65 cents for an 18-inch length for babies, up to about \$3.70 for a 48-inch length

DOMESTIC UTENSILS.

[By Consul Edward J. Norton, Bombay.]

Most of the domestic vessels used by the people of India are made of copper or brass, and departure from this usage is rendered difficult from certain ritual observances of cleanliness. Bombay is perhaps the chief center in India for manufactures of copper and brass, and large quantities of these products are sent to almost every part of the Presidency, near-by Provinces, and Native States. The raw product—copper and brass sheets—is cheaper here compared with other manufacturing cities removed from the sea, and there is a ready market for these goods in this growing capital. The industry is helped considerably by the immigration of the better class of workers from the rural districts.

CHANGING DEMAND FOR UTENSILS.

It is stated that copper and brass ware is being displaced in Bombay by other materials. Some of the workers are now making vessels out of imported German-silver sheets, and these are often preferred to brass or copper, especially among the wealthier classes. Another substitute of brass and copper vessels has been noted for some time, and there is a growing popularity for tinned ware among the poor people. The importation of kerosene oil in tins has given rise to a new industry. Enterprising artisans in Bombay and up-country are buying the empty tins at 4 to 10 cents each and fashioning them into all kinds of domestic utensils.

ALUMINUM GOODS.

The great need of a cheaper substitute for brass or copper vessels has created a large demand for aluminum goods, and some of the bazaar workers are now making utensils of this metal. Aluminum ware is used also in nearly all European households. Bazaar prices for aluminum utensils are not high; some of the more popular articles are polished stew pans, which in 2-pint sizes sell for 60 cents, including covers; 4-pint sizes cost 90 cents; 9-inch frying pans retail for 60 cents; 7-inch dinner plates sell for \$1.92 per dozen.

ENAMELED IRONWARE.

Enameled ironware is an item of peculiar interest, as it is slowly becoming a popular substitute for the distinctive Indian vessels of copper or brass. During the years when the prices of this metal were high the importation of enameled ironware made good progress; and in the fiscal year 1907-8 the total value rose to \$794,212 for all India, the share of Bombay for that year being \$296,029. But on the return of copper prices to normal level the importation of enameled ironware declined (In 1913-14 Bombay's purchases of enameled ironware amounted to \$194,850.)

GOOD MARKET FOR SHEARS AND SCISSORS.

[By Consul José de Olivares, Madras.]

South India is a good field for the sale of shears and scissors. The total population is 65,559,294, and there are several large cities, Madras having 518,660 inhabitants. In addition to the extensive domestic element which contributes to the local demand, there are in Madras 11,573 tailors, milliners, dressmakers, embroiderers, and hat, cap, and turban makers, and 3,409 barbers, hair dressers, and wig makers, all of whom are permanent purchasers of such articles.

METAL LAMPS.

The Director of Commercial Intelligence of the India Government, in discussing the metal-lamp feature of the Indian hardware trade, states that the most important development is the enormous stride made by the United States in capturing such trade. The imports from the United States, which were valued at \$375,051 in 1912-13, increased to \$577,105 in 1913-14, and the United States is now ahead of all other countries in this line.

Germany appeared in the trade returns as a larger exporter to India of metal lamps than Austria, but Austrian lamps were found on inquiry to be commoner in the Calcutta market. Bombay was known to be a better market for German lamps than Calcutta, but a certain number of the lamps entered in the trade returns as consigned from Germany were probably of Austrian make shipped from Hamburg. Imports from Germany into Calcutta consisted mainly of hurricane lanterns, while Austria supplies principally table and hanging lamps of various descriptions. The most popular Austrian lamps were Ditmar's hanging and table lamps, the demand being greatest for line No. 14 of the former and for line No. 10 of the latter description.

It is stated that a brand of American hurricane lanterns has become so popular that it has greatly affected the trade in the "Victoria" brand of German hurricane lanterns, for which there was formerly a good demand. The larger size of the German lanterns costs \$2.58 per dozen, as against \$4.36 per dozen for the cheaper quality of the American lanterns, the latter being made of tin. The relative cheapness of the German lamps is apparent from the trade returns, which show that 1,686,727 lamps imported from Germany were valued at \$328,657, whereas 1,102,836 lamps imported from the United States were valued at \$577,105.

METAL SAFES FOR SOUTHERN INDIA.

[By Consul José de Olivares, Madras.]

The term "metal safe" as employed in southern India embraces all sorts of metal receptacles for the safe-keeping of money and valuables, from the smallest strong box for holding cash and documents to the largest bank safe.

The extent to which ordinary large safes are used in Madras as compared with the amount of money handled in the course of local business is exceedingly small, while the advantages of modern fire and burglar proof safes, so commonly employed in other large business centers, have yet to be impressed upon the general trading com-

munity. However, it is believed that, like the comparatively recent local advent of the motor car, the approaching completion of modern safe installations in various Madras banking houses will be succeeded by a wider tendency toward improvement in the type of large safes commonly in use hereabouts.

Among the larger type of safes for which there is a demand in Madras, the average size is about 32 inches high by 20 inches wide by 20 inches deep, outside measurement, built with 3-inch steel walls, single door, key lock, and fitted with two small interior lock boxes for cash or documents. Such a safe retails locally for about \$55.

The popular local safe of the future, for general business purposes, it is thought, will be about 50 per cent larger than that described, but wider in proportion to its depth, built with walls of greater thickness, and fitted with exterior combination lock and inner door with key lock, together with the customary interior compartments and lock boxes for cash and documents.

The smaller portable safes or strong boxes, for which there is a

large and steadily increasing demand in Madras, range in size from about 12 by 7 by 5 inches to 18 by 10 by 7 inches. They are constructed of japanned steel, with nickel or brass trimmings, key locks, and fitted inside with trays and compartments for facilitating handling currency of various denominations, as well as being provided with space for documents, and retail at \$3 to \$16.

Safes and strong boxes are handled in Madras chiefly by department stores and dealers in office supplies.

A great deal of traveling has to be done by most of the European residents of India, as well as many natives. There is considerable camping out in tents in the summertime, especially in the hills, to escape the heat of the plains. The large military element in India has to act according to frequent moving orders. Convenient boxes for traveling meet with a ready sale, and steel boxes of the kind illustrated in the accompanying figure, which can easily be kept clean and resist damage from climate and white ants, are especially popular. An important industry for their manufacture has been established at Mooltan, in India.

METAL BEDSTEADS.

The most important distinguishing feature of nearly all the metal bedsteads used in India is the requirement of upright corner posts and framework on which to hang mosquito netting. If American manufacturers desire to participate with those of the United Kingdom in the important growing market for bedsteads in India, they should prepare designs giving especial consideration to the requirements of the Indian trade. As yet there is practically no importa-

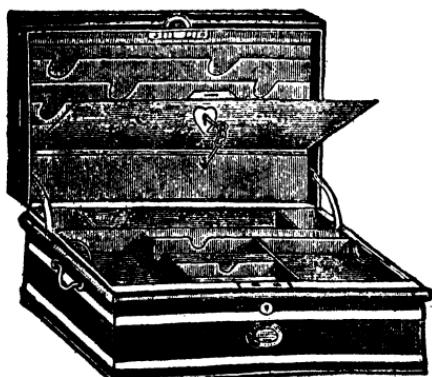


FIG. 12.—Office dispatch box.

tion into India of American metal bedsteads, except some of the folding kind, which find an important use in camp equipment. Some of the leading household furnishing and hardware dealers in the principal cities in India have received catalogues from the United States containing illustrations and other descriptive matter relating to bedsteads, yet such literature has received little attention, mainly because it was noticeable at a glance that the prevailing American types of bedsteads were not such as the Indian trade demands.

PROTECTION AGAINST MOSQUITOES.

In most parts of India protection against malaria-producing mosquitoes, which bite almost entirely at night, is an absolute necessity, especially as the use of wire screens to keep all such insects out of houses is almost unknown. The average Indian bungalow, as soon as lighted in the evening, especially during the monsoon period, is apt to swarm with all sorts of disagreeable insect life, and frogs, lizards, and even occasionally poisonous snakes, will make their appearance in bedrooms. It is usually the custom to set the netting over the posts of the beds before the rooms are lighted previous to retiring in the evening, and in the morning take them off again to allow the beds to be better aired. In some instances where mosquito netting may not ordinarily be required or desired the bedstead nevertheless may be so patterned that mosquito fittings may be readily clamped on when wanted. The sale of bedsteads without any provision whatever for mosquito nettings is so limited as hardly to justify consideration.

HIGHER STANDARDS OF LIVING.

The demand for metal bedsteads, according to statements of leading dealers, appears to be steadily increasing. Such demand comes not merely from the European population, but from more well-to-do native people, whose contact with Europeans has created a taste for higher standards of living. This class of natives has previously slept chiefly on common cotton or coir mattresses on the floor or on wooden benches or cheap wooden bedsteads. To the more educated persons the sanitary argument in favor of the bedsteads used by Europeans, as well as their greater comfort and more attractive appearance, has appealed; for it is quite obvious that unprotected environment while sleeping has had a great deal to do with the enormous prevalence among the native classes of such diseases as plague, malaria, and elephantiasis, the first mentioned being due to contact with rat fleas and the other diseases to bites of mosquitoes, which are aggressive chiefly during the night.

Almost all the coolie or laboring class in India sleep on the floors or on the sidewalks and streets. A walk through the native quarters in Bombay, for instance, will reveal in the evening hundreds of natives sleeping outside their houses, even in the street gutters; and it is an interesting fact that when the rainy season or cold weather comes, making outdoor sleeping impossible, the plague shows the most alarming tendency to spread. This is due to the native houses which are even more insanitary than the street gutters, and at such times also more overrun with rats, which likewise seek protection from the inclement weather.

The best-equipped houses or bungalows in India seldom make use of wooden bedsteads, as these quickly warp, crack, or otherwise deteriorate in the unfavorable climate, and are also much subject to damage by white ants and various kinds of boring insects. The metal bedsteads are of iron or brass; the latter kind being more expensive are more limited in sale. There is a wide range in the sale of metal bedsteads, from the cheap plain iron type to the most elaborate all-brass patterns. All sizes are sold, including double, three-quarters, and single, also children's cots, in iron and brass, and all brass, complete with woven-wire mattresses. As much ornamentation as is consistent with price and general utility is an advantage when catering for the native trade.

PRICES OF RETAILERS.

The retail prices in India for metal bedsteads range from about \$5 for a plain iron bedstead with wire mattress to \$50 for a combined iron and brass pattern. For all brass styles the prices run from \$55 or \$60 up to \$100, depending on the size and the design. From an advertisement of one of the leading furnishing houses of Madras, in a daily newspaper of that city, I take the following particulars for standard types of bedsteads locally used, with retail prices quoted:

1. A double bedstead, japanned black, with brass cups and knobs, $\frac{1}{4}$ -inch brass top rods, 1-inch pillars, $1\frac{1}{2}'' \times 1\frac{1}{4}''$ steel angle sides, fitted patent double-wove regulation wire mattress, with cable edges and centers and adjustable iron ends (no wood-work) fitted with patent star supports, which adds about 80 per cent to the strength of the mattress, complete with mosquito frames. Size $6' 6'' \times 4' 6''$. Such bedsteads complete cost about \$23.
2. A 4-post bedstead, double, with brass tops and knobs, 2-inch pillars, mattress with patent supports. $6' 6'' \times 4' 6''$. Such bedsteads complete cost about \$37.
3. A 4-post bedstead, double, with brass top rods, 2-inch pillars, $\frac{1}{4}$ -inch top rods, $\frac{1}{4}$ -inch folding cast neck vases or ornamental, fitted with patent double-wove wire regulation mattress with cable edges and centers and adjustable iron ends. Patent supports, which adds 80 per cent to the strength of the mattress, complete, size $6' 6'' \times 4' 6''$. Such bedsteads complete cost about \$42.
4. A bedstead with 1-inch steel tube sides, head and foot bows, steel-arched angles, fitted with strong wire-mesh mattress support with 24 best-tempered springs, to take almost any weight. Size $6' 6'' \times 3'$. Such bedsteads complete cost about \$10 each.
5. A strong three-part bedstead, with 1-inch tube bows, $\frac{1}{2}$ -inch tube rods in head, $1\frac{1}{2}'' \times 1\frac{1}{4}''$ steel angle sides fitted with galvanized diamond mesh mattress, with 12 specially tempered springs in head, nonsagging. Size $6' 6'' \times 3'$. Special clamp mosquito fittings can be used with this bedstead. Such bedsteads cost about \$5, with special quotations for hospitals and institutions.
6. A strong stump bedstead, specially intended for hospital institutions and infirmaries, japanned black, 1-inch tubing, $1\frac{1}{2}'' \times \frac{1}{2}''$ steel angle sides fitted with strong lath bottom. Such bedsteads cost about \$4.50, with special quotations for large quantities.
7. Twin all-brass French bedstead, extra strong and the very best finish, fitted 2-inch pillars with patent supports. This support prevents permanent sagging and adds 80 per cent extra strength and durability to a mattress; $6' 6'' \times 3'$. This bedstead costs \$57 single or \$107 for the pair.
8. Infants' swing cradles with iron frame and arm for mosquito curtain, sides of cradle made of soft netted cord. Size 3' long $\times 1\frac{1}{2}'$ wide. These cradles cost about \$6 each.
9. Chair bedsteads to be converted into easy chairs, lounges, or beds; made of strong iron and folds flat for traveling. These chair bedsteads complete with 3 cushions made of cretonne, cost about \$6.50 each.

Bed mattresses of cotton in India cost ordinarily about \$4 for single size and \$6.50 double size. Mattresses made of coir (coconut fiber) cost about \$3.25 single size and \$5.30 double size. Horsehair

mattresses cost from about \$12 for a 6-foot 6-inch by 2-foot 6-inch to about \$25 for 6-foot 9-inch by 5-foot 6-inch. Mosquito nettings or curtains are usually kept in stock to fit ordinary heights of bedsteads. They will cost about \$2.75 for single-cot size and about \$3.50 for a double-cot size. The best quality mosquito netting, 72 inches wide, costs about 40 cents per yard. Wire mattresses with clamps and bolts to attach to ordinary iron bedsteads cost from about \$4 to \$8 according to size. English horsehair pillows cost from about \$1.50 up to \$1.75, according to size, feather pillows from about \$1.60 up to \$1.75, and cotton pillows about 80 cents for the smaller sizes.

ORIGIN OF IMPORTS.

Practically all the bedsteads and bedding materials used in India come from the United Kingdom, but a few brass bedsteads are imported from France, and a few wire mattresses and a more important number of camp beds and cots come from the United States. I have heard some complaint from dealers that American wire mattresses in the Indian climate show too much sagging tendency, but with regard to American camp equipment there seems to be general satisfaction, and this line is rapidly growing in popularity on account of easy collapsibility, portability, and general utility for camping-out purposes. It may be well to mention that for camp beds there is also a demand for mosquito fittings, including brass poles, and coverings of canvas and netting.

The customs statistics of British India as a whole do not itemize bedsteads separately in imports of manufactured metals, but statistics show that in 1913 complete metal bedsteads to the value of \$114,786 were exported from the United Kingdom to British India, a gain of about \$25,000 in such exports over 1910. British manufacturers of bedsteads are now so firmly entrenched in the Indian market, and their goods are so generally suitable and well known to the trade, that it might prove difficult for American competition to succeed here, and it doubtless would fail entirely unless just as suitable goods, but at lower prices, could be offered in this market and aggressively advertised. The duty on bedsteads entering India is 5 per cent ad valorem.

GAS COOKING STOVES IN BOMBAY.

Indian Industries and Power, published in Bombay, in an article on the more extended use of gas in Bombay, supplied by the Bombay Gas Co. (Ltd.), mentions:

Already gas cookers are rapidly replacing the more inconvenient and dirtier arrangements of the Eastern kitchen. It is only the question of price which stands in the way of the almost universal use of the gas cooker in Bombay. At present the cost for lighting purposes is \$1.60 per 1,000 cubic feet, while the cost of gas for cooking purposes is \$1.12 per 1,000 cubic feet; but before long the prices for cooking will have been considerably reduced and the gas cooker, it may reasonably be expected, will be in use in the majority of houses in this city. We know how popular these cookers are in Europe, then how much more so should they be in the East, where we often shudder to think of the way our meals are prepared in the kitchen which we so seldom, if ever, enter.

MONSOON DRYING STOVES.

During the course of the monsoon in India, the atmosphere is so saturated with moisture that great damage is caused through rust and mildew, and it is necessary to use drying stoves to protect furniture and personal effects from too much dampness. Such stoves are also used for protecting rooms from too much chill at times. The type of stove illustrated herewith, of which about 60,000 are said to be in use in India, burns kerosene without smoke and is easily moved about. It costs between \$5 and \$10.

PACKING COOKING STOVES.

Many thousands of portable cooking stoves are imported into India every year, and the proportion that arrives broken is so great as to call for drastic action on the part of the manufacturers.

The usual method of packing the stoves is to place the legs and all loose parts in the oven and pack the stove in skeleton casing, tightly wedged with wood at those parts where, owing to projecting castings, the battens do not come into contact with the stove. Wood-wool pads are placed at each corner between the wood crating and the stove itself, and the crate is then iron clamped.

With careful han-

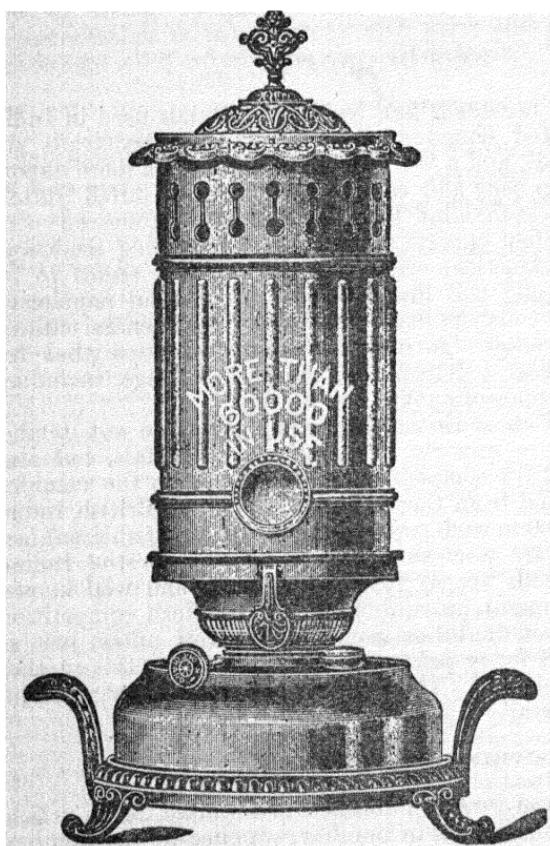


FIG. 13.—Monsoon drying stove.

dling a stove packed in this way should arrive at its destination in good condition, but unfortunately merchandise does not receive careful handling in India. For example, more than one-half of a consignment of 30-odd stoves recently received by a firm in southern India arrived broken.

The insurance policy by which merchants cover themselves against such breakages does not compensate them for the loss their business reputation sustains, for the majority of the breakages are beyond local repair, and weeks must elapse before replacements can be obtained from home.

One firm in India recently ordered its stoves to be sent out in parts instead of built up in original cases, but the manufacturers, while agreeing to comply with their customers' wishes in this instance, added that they did not care about doing so in future, as the stoves would have to be fitted in India by fitters over whom they had no control, and that consequently their reputation was likely to suffer. As a matter of fact, although the stoves arrived intact, the extra cost of packing, freight, and fitting up was so great that it was not worth while repeating the experiment. Other firms have stoves sent out in crates with straw pads, the crates being placed inside a heavy case, about 4 inches larger all round than the stove crate, the case again being tightly packed with straw. This method is fairly successful but exceedingly expensive both in freight and packing.

The following style of packing is inexpensive and most effective. All loose parts are placed inside the oven, and the stove is completely incased in wheat straw cut into lengths. It is then strongly and closely crated, so that the straw is compressed to a thickness of 3 to 4 inches, and the crate is clamped with iron.

BIRD CAGES.

It is a common practice in India to keep birds as pets in captivity, parrots being most popular for this purpose, but cockatoos, mainas (a smaller kind of talking bird), canary birds, doves, and gray-headed love birds are also frequently seen in cages. The bird market at Bombay is one of the most unique sights of this city, there being offered for sale here thousands of birds, chiefly from India and the east coast of Africa, especially Zanzibar. There is a surprising number of dealers here who make their living from this trade in birds.

The fad of keeping birds as pets necessitates the use of large numbers of cages, and a few of these, of the more superior class, are imported from the United States. The greater number of cages, however, including all of those seen at the Bombay bird market, are of native make.

At the Army and Navy Cooperative Stores at Bombay, where good qualities of cages are sold, the makes are mostly American and the prices are much higher than for native cages. The chief demand is for parrot cages. Dealers state that while there is a good demand for cages, yet the native article, though crude and unpretentious, is so much cheaper than imported types, that sales of the latter are comparatively few. However, for parrot cages, the imported types being much more substantial, attractive, and appropriate to the habits of this much-esteemed bird, are bought, notwithstanding the high prices, whenever people can afford them.

ELECTROPLATED SILVERWARE.

There is increasing competition in India in the sale of electroplated silverware. The importance of the market, especially in demand from army officials, is apparently well recognized in England, and commercial travelers are now sent out to push the trade and get in touch with the chief individual customers.

It has been found an unsatisfactory policy in India, generally speaking (although there may be exceptions), to intrust any one native firm with an exclusive agency for India, or even for a particular Province, as such firms seldom exert themselves to advertise or otherwise push business, and unless the demand is independently worked up for them in some way their sales, as a rule, never show any tendency to increase. For this reason it is desirable, in the case of an article like electroplated silverware, to make use of traveling men independent of native firms, although there are some leading English mercantile houses, with headquarters at Bombay, Calcutta, Madras, and Colombo, and branches in many smaller cities, which are in a position to undertake the sale of American ware, provided they do not already have conflicting lines in stock. While I have heard no complaint against American silverware, except sometimes that it is "too soft," it is obvious that English ware holds easily the first place here, partly because of conservative prejudice in its favor and partly because English firms have given the Indian market more careful attention.

DEMAND CONSTANT AND SUBSTANTIAL.

On the train from Hyderabad to Bombay one day I met a commercial traveler who, among other lines, was handling electroplated silver goods for an English house. He told me that he was meeting with good success in selling such articles, especially to the many clubs, military messes, etc., throughout India. He approaches these clubs and messes directly through their secretaries and solicits their business; and as the regiments are changed about every three years new orders usually come for silver service at these triennial periods, as the new mess always has a new service, the old being sold second-hand. A great deal, however, usually disappears through pilfering by servants in the employ of the mess, and the balance has usually deteriorated so much through rough methods of cleaning that it is only natural that new messes coming out wish to buy fresh sets of silverware, and that the demand from the clubs, hotels, and for individual homes always seems to be substantial and constant.

It is customary for each mess or club to have its own special monogram or crest on each piece of silver, and travelers who represent such lines always carry a book of monograms from which selections may be made and sent in with the orders. The hardest sort of plate is usually preferred in India in order to insure reasonable durability. This applies, of course, especially to articles intended

for really active use, which must stand considerable wear and not for more or less ornamental purposes. The chief demand for imported silverware, both plated and sterling, comes chiefly from the English population and from a few Indian princes and other wealthy natives. It must be remembered that India itself is an important producer of artistic silver goods, and many beautiful and curious pieces, hand-wrought, are found in the bazaars.

RETAIL PRICES IN MADRAS.

Silverware, both sterling and electroplated, is dealt in not only at jewelry shops but also in the stores of nearly all leading general merchants. Although it is not a rapidly moving class of trade, like dry goods and provisions, yet the profits are said to be quite large. Such ware meets with frequent purchase for holiday and wedding gifts, prizes, and tokens of honor and esteem, as well as for ordinary household, club, hotel, and other necessities.

From a catalogue of a leading English firm in Madras some of the articles sold and approximate retail prices are quoted as follows:

Ladies' sterling silver waist buckles, $5\frac{1}{2}$ inches long, about \$7.25; sterling silver sugar tongs, \$3 to \$4; sterling silver candlesticks and ink pot, \$8.50; silver photo frames, \$3; cabinet size, plain sterling silver cardcases to fit pocket, \$5.25; sterling silver sauce boats, \$11; sterling silver toast racks (very much used here), \$10; teddy bear baby rattles, \$3 to \$4; gentlemen's cardcases, \$6; solid silver tea sets, \$40 to \$50; manicure sets, \$10 to \$20; sterling silver christening mugs, \$10 to \$15; silver-mounted cologne bottles, \$4; child's silver cup, \$5.50; silver hand mirrors, \$8 to \$10; electroplate on nickel-silver afternoon tea sets, \$35; toast racks, \$5 to \$6; cake or biscuit dishes, \$8.50; round, 3-section, vegetable dishes (much used), \$17 to \$20; electroplated cake baskets, \$10; fruit stands, \$8.50.

ALUMINUM INDUSTRY.

The working of aluminum in India is making significant headway and promises to become one of the most important industries of this Empire. Imports of aluminum ingots and sheets into India from Europe and the United States now approximate over 1,500 tons per year. For working this metal in India with a minimum of difficulty the aluminum provided should be free of "muck" and as uniformly pure as possible. The imports of aluminum (presumably sheets and ingots) into India during the fiscal year ended March 31, 1914, were about 1,315 tons. Of this, about 180 tons came from the United States, 605 tons from Germany, 390 tons from Great Britain, and 85 tons from France, small quantities being received from Belgium, the Netherlands, and Austria. The principal factories for the working of aluminum are at Madras and Bombay. The number of factories making aluminum vessels in India is about 40, while the capital employed is estimated at nearly a crore of rupees (\$3,244,000). Other small establishments are found chiefly near the eastern coast between Calcutta and Madras. It is the opinion of the Director of Industries and Commerce of the Native State of Mysore that great encouragement would be given to the establishment of small plants for working aluminum ware if small electric induction furnaces of, say, 10 to 20 pounds capacity for melting the aluminum could be introduced. If suitable furnaces could be introduced, the governments of southern India would doubtless be willing to cooperate to encourage their sale.

MARKET FOR AMERICAN WARE.

As the demand for aluminum ware in India promises to increase faster than the local establishments for working it can keep pace, there might seem to be an existing opportunity for American manufacturers of aluminum to sell in this market not only the raw material of ingots and sheets but also finished articles, such as water-carrying vessels and cooking utensils. The daily supplies of water for the native houses in India must often be carried for long distances, on account of the caste rules of prejudices, in order to secure water not defiled by other castes. The use of metal vessels or receptacles for containing water is, therefore, of great importance. When the natives are extremely poor they use earthenware vessels, but as their means increase they adopt the use of metal ware for carrying their water. Of late the advantages of aluminum for this purpose are becoming recognized, as it is not only much lighter but much cheaper than the vessels of copper or brass usually carried. Many metal dealers are now specializing in aluminum goods. Another important and rapidly extending use for aluminum in India is for manufacturing cooking utensils, especially kettles, gridirons, sauce pans, stew pans, and frying pans.

TEXTILE MANUFACTURES.

COTTON MANUFACTURING INDUSTRY.¹

The growing of cotton, the spinning of cotton yarn, and the weaving of cotton cloth, as well as certain connected industries, such as tent manufacture, are constantly growing in importance in India. The chief center of the cotton trade and of cotton manufacturing industries is Bombay. The total area planted in cotton in all the territories in India for the 1913-14 crop is computed at 24,505,000 acres, which marks a net increase of 2,567,000 acres, or 11.65 per cent over the cotton acreage of the previous year. The total estimated output of cotton for 1913-14 is 5,201,000 bales of 400 pounds each, which represents an increase of nearly 13 per cent over the output of the preceding year.

NUMBER AND OUTPUT OF COTTON MILLS.

Cotton manufactures now represent about 21 per cent of the total value of Indian manufactures exported and about 5 per cent of the whole export trade of the country.

The total number of cotton mills in all India in 1913 was 272 with 6,596,862 spindles and 94,136 looms. During the preceding year the number of spindles in India was 6,463,929, and the number of looms, 88,951. Since 1890 the number of spindles in India has about doubled and the number of looms more than quadrupled. Among the chief cotton-textile manufacturing countries of the world India now ranks about fourth, being exceeded in number of spindles and looms only by Great Britain, the United States, and Germany. The outturn per spindle in India during 1912-13 averaged 104.35 pounds as against an average for the preceding three years of 97.97 pounds. The average monthly production per loom in 1912-13 equaled 252 pounds, against 208 pounds in 1908-9. The mills of the Bombay Presidency spin nearly 75 per cent of the quantity produced in British India. The United Provinces and the Province of Madras produce about 7 per cent each, while Bengal and the Central Provinces produce 5.5 and 4.7 per cent, respectively. The mills on Bombay Island spun 363,681,000 pounds of cotton yarn in 1912-13, and the mills of Ahmedabad, also in the Bombay Presidency, spun 67,810,194 pounds. The mills of the Bombay Presidency produce nearly 87 per cent of all the cloth woven in India.

The total quantity of yarn spun in India during the month of January, 1915, amounted to 53,583,000 pounds and that of woven goods to 25,205,000 pounds, as compared with 60,148,000 and 21,016,000 pounds, respectively, in the corresponding month of the preceding year, recording a decrease of about 11 per cent in the former case but an increase of 20 per cent in the latter. In the 10 months from

¹ A textile expert of the Bureau of Foreign and Domestic Commerce, Commercial Agent Odell, will include the cotton trade of India in his Far Eastern investigations. It is anticipated that his report on India will be comprehensive, and it will appear in a separate monograph.

April, 1914, to January, 1915, inclusive, the quantities were 540,344,000 pounds of yarn and 229,280,000 pounds of woven goods, as compared with 571,450,000 and 230,113,000 pounds, respectively, for the corresponding period in 1913-14.

CHANGES IN THE MARKET AND THE INDUSTRY.

In the early history of the cotton-textile industry in India the mill owners were concerned chiefly with the production of yarn for export to China and for use in the hand looms of India. The name "calico" came from the fine hand-loom woven goods of Calicut on the Malabar Coast in Southwestern India. The increasing competition of Japan with India in the China market and also the growth of a textile industry in China itself, has caused India mill owners to pay more attention to the cultivation of their own market. The general tendency of recent years has been to spin higher counts of yarn, importing American cotton for this purpose, to supplement the Indian supply, to erect more looms, and to produce more dyed and bleached goods. Gray (unbleached) goods still represent nearly 77 per cent of the whole production, but dyeing and bleaching are making rapid progress.

PRODUCTION AND EXPORT OF YARN AND CLOTH.

The quantity of yarn produced in India during the fiscal year ended March 31, 1913, amounted to 688,421,750 pounds, as against 625,030,199 pounds during the previous 12 months, or an increase of 63,391,551 pounds, or 10.14 per cent. Of this amount 254,881,967 pounds were consumed in the production of 285,467,804 pounds of cloth and 203,961,357 pounds were exported to foreign countries during the official year 1912-13, leaving a remainder of 229,578,426 pounds.

Although exports of Indian yarn to China still furnish by far the most important item of export, yet exports to China of Indian yarn show a tendency to decline. The total shipments of yarn from Bombay to China during the calendar years 1912 and 1913 amounted to 433,989 and 405,359 bales of 400 pounds each, respectively, showing a decrease of 28,630 bales, or 6.59 per cent. Concerning this the recent annual report of the Bombay Mill Owners' Association for the calendar year 1913 says:

In the yarn trade, it may be observed, Japan has now outstripped India. But according to the most authentic reports, Japan itself is now feeling the pinch of the outturn of yarn in Chinese mills, which are mostly located in Shanghai. Having regard to the certain development of the country by means of railways and the determined efforts of the Chinese to build more cotton mills in the country, it is only a question of time when both Indian and Japanese yarn may be wholly driven out. At the same time the growing expansion of power looms in India is partially absorbing the quantity which China has diminished, though it does not appear that there has yet been any appreciable increase in the outturn of counts of 30s. and above.

The shipments of yarn from Bombay to the United Kingdom and the Continent during the calendar year 1913 amounted to 583 bales, as against 2,508 bales in 1912.

The production of cloth in India during the official year 1912-13 amounted to 1,220,414,529 yards, as against 1,136,151,590 yards in the previous year, showing an increase of 84,262,939 yards, or 7.41 per cent. Exports to foreign countries during the official year show

an increase of over 5,000,000 yards over 1911-12. Exports to China from Bombay in the calendar year 1913 decreased 277,620 yards, or 26.69 per cent, the exports in 1912 being 1,039,900 yards, but in 1913 only 762,280 yards. The total production of yarn in India for the calendar year 1913 amounted to 679,338,815 pounds, and for cloth to 269,035,540 pounds, or 1,146,279,867 yards. There is a decrease in production of yarn from the previous calendar year amounting to 0.83 per cent, and in cloth (yards), of 6.30 per cent. It will be noticed that the comparison of the official year ending on March 31, 1913, with 1912 is more favorable than the comparison of the calendar year 1913 with 1912. This was due to poor conditions in the trade near the close of the calendar year 1913, caused partly by a famine in some localities.

The following statistics covering the production of cotton cloth in India in the nine months ending with December, 1913, may be of interest:

Gray (unbleached) and bleached piece goods.	Pounds.	Gray (unbleached) and bleached piece goods.	Pounds.
Chadars.....	18,857,489	Other sorts.....	5,047,206
Dhutis.....	43,936,878	Colored piece goods.....	55,303,584
Drills and jeans.....	5,499,167	Gray and colored goods, other than piece goods.....	1,700,390
Cambrics and lawns.....	570,185	Hosiery.....	403,737
Printers.....	4,449,684	Miscellaneous.....	102,980
Shirtings and long cloth.....	48,683,088	Total.....	208,943,039
T-cloth, domestics and sheetings.....	22,677,652		
Tent cloth.....	1,621,599		

INDIAN COTTON CHIEFLY USED—LOSS BY COTTON FIRES.

The principal varieties of cotton used in the Indian textile industry are the indigenous short-staple, early maturing kinds, grown chiefly in districts where the rainy season is brief, and a certain amount of imported cotton, chiefly American. The total imports into India of American cotton during the official year 1912-13 were 71,363 bales of 392 pounds each; in 1913-14 there were only 120 bales. The total estimate of the Indian crop for 1913-14 is 5,201,000 bales of 400 pounds each, as against 4,610,000 bales in 1912-13. In general it may be said that the prices of Indian cotton fluctuate in sympathy with the market for American cotton at Liverpool and New York. The attention of the world has lately been directed to the remarkable series of cotton fires occurring at Bombay, occasioning financial losses estimated at about \$3,500,000 during 1914.

EXPORTS OF INDIAN COTTON.

The chief exports of Indian cotton are to Japan, Germany, Belgium, Austria-Hungary, France, the United Kingdom, Spain, and China, in about the order named. Japan, which took in 1913-14 4,817,560 hundredweight (3½ cwt.=1 bale), is by far the best customer for Indian cotton. The United Kingdom is a very small purchaser of Indian cotton, taking in 1913-14 only 384,914 hundred-weight. The higher counts of yarn now chiefly spun in Lancashire can not be produced with Indian cotton, so that the United Kingdom must get most of its supplies from the United States and Egypt.

The Indian cotton, however, finds a useful function in Japanese mills. Formerly Japan also bought Indian yarn largely, but its own textile industry has expanded so rapidly in recent years that it is now not only independent of the Indian yarn supplied, but is a strong and successful competitor for the Chinese trade, and even exports small quantities of hosiery to India, where its goods have secured an entry owing to their cheapness. Next to Japan the best market for Indian cotton is on the continent of Europe, where this short-staple variety, owing to its cheapness, has a ready sale. As a cotton-producing country India first assumed importance during the American Civil War. The production of Indian cotton doubled during that period, and enormously inflated prices were obtained for it, as the English spinners were obliged to depend on it, regardless of its cost. The estimate of the surplus wealth brought into India from cotton during the American Civil War is as high as \$450,000,000.

The distribution of Indian cotton for export, mill consumption, etc., during the year ending with September 30, 1913, was as follows: Net exports, 2,307,000 bales; mill consumption, 1,806,000 bales; consumption outside mills (conjectural), 450,000 bales; total, 4,563,000 bales. For 1912 the figures were: Net exports, 1,773,000 bales; mill consumption, 1,781,000 bales; consumption outside of mills, 450,000 bales; total, 4,004,000 bales.

IMPORTS OF COTTON PIECE GOODS AND YARN.

Notwithstanding the considerable development of the Indian cotton textile industry, there appears to be no tendency toward diminution in imports of cotton piece goods. These imports from the United Kingdom for the year 1913-14 amounted to 3,104,311,465 yards, as against 2,412,059,210 yards, the average for the 10 years 1904 to 1913. Imports of yarns from the United Kingdom amounted to 37,836,092 pounds, as against 35,145,840 pounds average for the 10 years 1904 to 1913. Although the import trade from Japan is still small compared with that from the United Kingdom, it has grown rapidly in recent years. During the year under review, 8,900,578 yards of piece goods and 1,200,260 pounds of yarn were imported from Japan, whereas during 1909-10 imports amounted to only 76,808 yards of piece goods and 40 pounds of yarn. The increased imports of cotton yarn and piece goods into India, notwithstanding the large development in local milling and increased production of yarn and piece goods locally, reflect the increasing prosperity of India and the improved purchasing powers of its inhabitants.

SCARCITY AND LOW PAY OF LABOR.

In the informal discussion of the cotton-milling situation in India at the recent meeting in Bombay of the Millowners' Association, the statement was made that perhaps the greatest difficulty in the cotton textile industry of India is the scarcity of efficient labor. The chairman said that although India is one of the poorest countries in the world, and the average income is only some \$10 per head per year, yet the Indian cotton textile industry needed about 100,000 men in Bombay alone. The Indian laborers, he said, are now beginning to combine among themselves, and he added that it

would not be surprising if before long they should occupy some such position as in Europe and the United States. He suggested that rather than shun and ignore the movement, and thus force it into undesirable hands, it should be guided and regulated and millowners should seek to win the confidence of their employees by looking to their sanitation, giving them educational facilities, arranging for their suitable housing, and encouraging cooperative credit societies.

The Bombay cotton mills employ an expensive staff of managers and overseers, but the average rate of wages to workmen is said to work out to only about \$90 per year for each workman. Individual efficiency, however, is understood to be low as compared with that of the average English and American workman. The Indian workman has a tendency to be migratory in his habits and careless at work and is said to need constant attention to prevent him from shirking work.

ELECTRIFICATION OF COTTON MILLS.

A considerable financial saving to the Bombay mills should result from their electrification, which will be accomplished before the end of 1915. Thirty-four mills have contracted to use the electric power to be shortly available from the Tata Hydro Electric Power Co. Each of these mills is to be supplied with a separate feeder, but in case of any trouble with the individual cable to the mill current can be supplied by a cable which is common to all.

INDIA WILLING TO BUY HIGH-CLASS GOODS.

Gray and colored striped drills continued in fair request, but business with manufacturers was difficult to negotiate, the delivery question being, as a rule, more troublesome than the current price. Makers generally are heavily engaged for months to come on contracts at full rates, and under existing conditions there is little inclination to lower prices, even when cotton may be somewhat easier. India is still a free buyer of fancy finished striped drills, and comparatively high prices are offered to agents if quick delivery can be guaranteed. The present demand from Karachi, Delhi, and other centers is a surprise to many of the Indian shippers, as in former years the requirements were for cloths with the least possible margin of profit, and makers, except when they had looms coming empty, would not accept these unremunerative contracts.

AMERICAN TEXTILES FAVORED.

Gray drills in the better qualities are also inquired for to compete with the well-known high-class makes of American drills that are now in favor with Indian buyers. White Florentine drills, although high in price, have a fair sale in Bombay and Calcutta. China striped twills, both raised and finished, are well under order, and fair repeats could be booked for Hongkong if prices were somewhat easier. The ordinary China gray drill trade in the lower makes is, however, dull, the offers from Shanghai being too low for manufacturers.

COTTON INDUSTRY IN SOUTH INDIA.

Cotton is the chief industrial crop of southern India and the expansion in its cultivation has been one of the most noteworthy features of recent years, exports having more than doubled in quantity and more than trebled in value within the last decade. This has been due chiefly to the introduction of Cambodia cotton, the cultivation of which seems much better suited to the country than the kind known as Tinnevelly, which had previously been almost the only kind grown here.

IRRIGATED COTTON GROWING.

Cambodia cotton closely resembles the American upland variety and flourishes as a heavily manured and irrigated crop. The first attempts to grow it as an ordinary dry crop failed, but its success under irrigation has been so great that during the last five years of the decade ended in 1912 its output has expanded from 40 bales of 500 pounds each to an estimate of 80,000 bales. This cotton gives a high percentage of lint to seed and a good length and quality of fiber. In money value it is estimated that 1 acre will produce lint valued at \$75, as against a value of only about \$12.50 from ordinary Tinnevelly cotton on dry land. Cambodia cotton cultivation in southern India is now sufficiently profitable to be replacing such valuable crops as tobacco and chillies. By the establishment of governmental seed farms the quality and quantity of cotton grown per acre are showing considerable increase. In 1913 the area under cotton cultivation in the Madras Presidency and the Native State of Mysore was 2,540,899 acres.

The cotton industry of southern India in its various branches employs more capital and gives employment to a larger number of people than any other industry. In the Madras Presidency in 1901 there were 24,089 people engaged in cotton ginning, cleaning, and pressing, and in 1911, 32,553, an increase of 35.1 per cent. During this period there has been a large increase in the amount of ginning done by machinery and a corresponding decrease in hand ginning.

COTTON MANUFACTURING.

The largest cotton mills in southern India are the Buckingham and Carnatic mills in Madras, which not only do weaving but dyeing and bleaching as well. Each of these mills employs about 5,000 people daily, whose individual wages have increased from 50 to 80 per cent during the past 20 years. Each operative is credited with a gratuity of 5 per cent of his monthly wage and at the end of every half year in which the mill has worked to a reasonable profit a similar amount is added, the whole bearing interest at 4 per cent. Each employee must serve 10 years before he can draw upon this fund, but payments are made for injury or death. The success of this scheme has been marked, and no strikes have taken place since its introduction.

There has been a large development in this Presidency of the export trade in coarse yarns, together with a big increase in the

importation of foreign yarn, which is of counts higher than those spun in Indian mills. In the three years from 1907 to 1910 the hand looms used 179,572,000 pounds of yarn. The substitution of fine yarn for coarse means much extra work for the hand weavers, and a proportionate increase in the value of their outturn.

HAND-LOOM WEAVING ENCOURAGED.

The new census in 1900 revealed 167,806 hand looms in the Presidency. Through efforts fostered by the local government, there has been a marked development in the use of the fly-shuttle slay, which increases the average output of each loom 50 per cent. All over the country weavers now use this type of hand loom, but on the east coast in the northern Circars the transformation has been on a big scale. Recently the Madras Government deputed a special officer to investigate, and in 89 villages 6,528 fly-shuttle looms were actually counted. The total number exceeds 10,000. Not only have the earnings of the hand-loom industry increased about 33 per cent since the introduction of the fly-shuttle slays, but there is now an increased demand for the finer products of this industry. This is borne out by the marked increase in the number of hand-loom weavers in such centers of fine weaving as Kumbakonam and Madura. In the former town the increase since 1900 has been from 465 to 1,824, and in the latter from 9,353 to 15,117. In Madura, one of the leading Indian centers of the dye trade, this industry has developed spontaneously with the weaving industry. The dye trade of this city now deals with 2,000 bales of cotton monthly.

EFFICIENT HAND LOOM DEVISED BY AMERICAN.

The hand loom illustrated in figure 4, which promises to revolutionize the hand-loom industry of India, in which immense numbers of natives find employment, is the result of 11 years of experiment by an American missionary, Mr. D. C. Churchill, connected with the Deccan Industrial Institute, maintained by the American Board of Foreign Missions at Ahmednagar, Bombay Presidency. This loom is now producing, in the hands of one person, as shown in the picture, in a $7\frac{1}{2}$ -hour day, 40 yards of "dongre," a coarse cloth suitable for toweling. Some 16 looms are running at this institute. This loom doubles the efficiency of a previous loom devised by Mr. Churchill, which received the first prize, a gold medal, in India's largest industrial exhibition, in Bombay, in 1904. Mr. Churchill has received from the Indian Government about \$9,000 in contributions to his important experiments. He has also received many offers of very high salaries from European textile-machinery firms, who desire to secure his services, but he has declined to abandon his missionary work in India. The Deccan Industrial Institute under American missionary auspices aims to do for western India what Hampton and Tuskegee are doing for the South in America. Hand weaving is, next to agriculture, the largest industry of India and the output of hand cloth is not diminishing. Its future in India has been rather thoroughly studied, and it seems reasonable to count on a vigorous hand-weaving industry for several generations to come.

THE MILLS OF MYSORE.

In the Native State of Mysore the cotton spinning and weaving industry is also flourishing. There are already two important cotton mills in Bangalore. The town of Davangere has in recent years become a center of considerable importance in connection with the cotton trade and there are a number of ginning factories and baling presses working there. The prospects of the cotton-mill industry in Mysore were carefully investigated by the experts of Binny & Co. (Ltd.), Madras, managers of the Bangalore Woolen Mills, and they concluded that if they could obtain a contract from the Mysore Government for electrical energy at about the rates they were paying for the woolen mill, they would be prepared to invite capital for erecting another mill with 20,000 spindles and a weaving shed with 500 looms. As no electrical power will be available until the extension of the water-power plant at the Cauvery Falls (recently started), the establishment of this new mill at Bangalore must be held in abeyance. It may be assumed that, as soon as electricity is available, there will be little difficulty in attracting outside capital into the cotton-mill industry. In the meantime this firm is adding a 500-loom weaving shed to its present mill in Bangalore.

WAGES—HUMIDIFICATION—JAPANESE COMPETITION.

In visiting the cotton mills at Bangalore it was noticed that much of the work was performed by children of both sexes who do not receive over 5 cents per day. The hot climate of southern India makes the atmosphere of the mills here extremely oppressive, but in constructing new mills attention is now paid to making them more spacious and better ventilated and to cooling the air with fans and machines for spraying light jets of water. Practically all the machinery of south Indian mills is of English manufacture, except electrical equipment, which is from the United States.

In the particular class of goods turned out by the south Indian mills Japanese competition seems to be more feared than that from the United Kingdom, while that from the United States does not seem to be considered. As the total imports of cotton goods into this section of India represent 34 per cent of the total value of imports, it would seem obvious that with the enormous home market provided by over 70,000,000 people, the local mills have a great field for catering to the local demand.

MACHINERY.

No American machinery appears to be used (except electric motors), not even for ginning the cotton. English gins of 40 to 80 pounds capacity are used entirely, and cost an average of \$200. The complaint concerning American gins is that they tear the cotton and break the staple. There are now a considerable number of small factories each with two or three gins driven usually by oil engines, most of which are of English manufacture.

The fly-shuttle slays recently introduced into the hand-loom industry with such marked success are all made locally and cost only about \$1.50 to \$7 apiece. The United Kingdom supplied about 97 per cent of the yarns imported for weaving.

COTTON PIECE GOODS.

An Indian merchant in Bombay, to whom some samples of American cotton piece goods were submitted, wrote the American consul there as follows:

We understand that American merchants are not able to send large consignments. We beg, therefore, to suggest that they manufacture the goods according to our samples in small lots only. We take upon ourselves to introduce the said lots in our markets, and when approved we undertake to pass the goods on our own behalf.

We think it will be better if different American manufacturers communicate with us direct and send us such sample goods as are at present manufactured by them, and on seeing which we shall be in a position to direct them to produce the goods to suit the requirements of Indian markets, such as gray, bleached, fancy, turkey red, prints, chadders, suses, etc.

If American merchants are really serious about introducing their goods in India, which is a big market, we would advise them to undergo some sacrifice in the beginning, as without this they can not expect to get hold of any new market. We will assist them as much as we can to enable them in a short time to compete with Lancashire goods.

This firm states that these qualities are sold weekly in hundreds of bales and are exceedingly well known on the Bombay market. If the American manufacturer can produce something that can compete in quality and price and can have it properly introduced, the possibilities of this market are very great. These are only three of the numerous grades that are sold in Bombay. Weekly quotations are made of some 80 different brands of cotton piece goods. The only American piece goods which are quoted weekly are Pepperel drills, which are well and favorably known.

Lancashire and Continental mills appoint reliable local agents, whose marks are placed upon the particular grade of goods, and they look to the agent for the sale as well as hold him responsible for all shipments. Usually the imports are made by a firm sufficiently strong financially to purchase the goods on such terms as are satisfactory to the manufacturer. The inquirer is willing to accept such terms. Once the goods are introduced by the agent and the brand becomes well known on the market, very little is required in the way of advertising to keep the sales going. The Indian people are conservative and continue to buy an article which has an established place on the market. If the manufacturer intends to go in extensively for the trade, it will be to his advantage to send a personal representative to study conditions and not depend entirely upon correspondence to become familiar with requirements. After the trade is known and the agency established with a firm financially strong enough to conduct the business, there is no reason why he should not obtain a good part of the sales if prices and quality are satisfactory.

CALCUTTA'S IMPORTS OF COTTON GOODS.

[By Consul General James A. Smith, Calcutta.]

A considerable advance over the preceding year in the import trade of cotton goods was shown in 1912-13 and a still greater increase in 1913-14. Imports of twists and yarn declined. Piece goods, hosiery, handkerchiefs, and shawls all marked an advance. The greater part of the trade is held by Great Britain, and the year is summed up by an authority as a profitable one for the Lancashire industry, although it became evident at the beginning of 1914 that a setback was approaching. The increase in looms led to excessive production and

the Indian market became congested, marked by a sharp decline in prices during the latter part of the year. The tightness of money in Calcutta, the general panic in the money market, and the famine in the United Provinces accentuated the unfavorable position, and dealers lost heavily, but the outlook became brighter toward the end of the year. The value of the imports of cotton goods into Calcutta from all countries during 1912-13 and 1913-14 is shown in the following table:

	Cotton goods.	1912-13	1913-14
Cotton fabrics:			
Piece goods.		\$86,132,835	\$87,492,540
Gray, or unbleached.	60,670,980	60,935,716	
British.	60,477,942	60,703,422	
Foreign.	193,038	232,294	
White, or bleached.	14,114,472	13,887,588	
British.	13,846,165	13,609,339	
Foreign.	300,750	258,249	
Colored (printed or dyed).	11,347,383	12,689,236	
Other.....	4,683,519	6,180,454	
Total.....	£0,816,354	93,672,994	
Twist and yarn.....	4,012,591	3,096,391	
Total cotton goods.....	94,828,945	96,769,385	

TENTS AND CAMP FURNITURE.

The use of tents in India is so extensive that catering to the demand has become one of the most interesting and important industries in this Empire. The chief center of manufacture is at Cawnpore, which has the largest tent factories in the world and not only does an enormous domestic business but also exports largely to other countries, including United Kingdom, China, Japan, Australia, New Zealand, Siam, Straits Settlements, Egypt, and other parts of Africa.

Tents have peculiarly important uses in India, not only for military purposes, but for furnishing temporary residences and offices in localities and for occupations in which it would not be convenient or economical to construct houses. They are much employed, especially in the hill stations of India, to furnish annexes to private houses which may be too small to accommodate visitors, and they are also utilized by officers in charge of forests, railway and irrigation surveys, persons on hunting or exploring tours, etc. Moreover, at times when any particular important event occurs in a city to attract large crowds of people, tents supplement the ordinarily limited accommodation at hotels. A notable instance of this latter use occurred at the Delhi Durbar several years ago, when the great majority of visitors, including the King-Emperor and Queen-Empress and all the Indian princes and nobility, occupied tents just outside the city. It is said that never before in any time of peace in the world's history had so many tents been pitched in any one place.

EXCELLENCE OF LOCAL PRODUCT PRECLUDES FOREIGN COMPETITION.

The popular use of tents is due not merely to the peculiar conditions of life in India and the more or less transient character of its population, but also to the fact that Indian tents are so excellently

and elaborately made that, for most purposes for which they are required, they are just as comfortable, if not more so, than the average Indian bungalows. With the exception of circus tents, I have never seen in the United States any which could approach, in appropriate designs and general excellence, many of the styles of tents used in India. Although American cotton material enters to some extent in the manufacture of tents in India, it is not suggested that American made-up tents could find a market in India, for the reason that American tents could hardly compete, at present at least, with the excellent design and workmanship of the tents made in India.

Upon my arrival at a hill station in Baluchistan as guest for several days of a leading official of that country, I was furnished with a handsome tent for my private use, which contained excellent furniture and fine rugs over the floor and had a bathroom annex. During my occupancy a severe storm raged outside, and a deluge of rain fell on the tent, yet the interior was as dry and comfortable as if one were inside a building of brick or stone. On examining the way the tent was built and located, it was found that there was really an outside and inside tent; at least the top part was of double construction, so that if any water managed to get through the almost waterproof top layer of canvas, none of it could get through into the living space below. Moreover, a small ditch was dug all around the tent, so that there was perfect drainage. Most persons who use tents in India have plenty of servants who are expert in quickly erecting or taking them down; also, the tents are manufactured in parts which can be readily separated and packed, each by itself, and conveniently transported by camels, mules, or horses.

INDUSTRY CENTERED AT CAWNPORE.

At Cawnpore there are three large establishments where are manufactured most of the tents used in India or exported. These are the Elgin Mills Co., the Cawnpore Cotton Mills Co. (Ltd.), and the Muir Mills Co. (Ltd.). I visited the first-named mills, which are the largest producers of tents in the world, with an annual output of something like 50,000 tents of all kinds. At these mills every manufacturing operation, from spinning the cotton and weaving the yarns to making up the tents, is carried on. I was told that a certain proportion of the raw cotton thus used is imported from the United States, as it is necessary to mix a certain proportion of American long-staple with short-staple Indian fiber. However, the exact proportions of American cotton used and other technical features in manufacturing cloth for the tents were considered trade secrets and not divulged.

In general, the outer folds of cloth used (unless specially ordered otherwise) are closely woven so as to possess great strength, durability, lightness, and power of resistance to sun and rain. They are all presumed to have quick-drying properties, a most important consideration for those who have to strike camp and travel in all kinds of weather. The sales of tents from this particular factory alone are said to have quadrupled within recent years, notwithstanding the keen competition that has sprung up from other mills. These Elgin Mills have been making tents for half a century.

TYPES MOST IN USE.

Among the types of tents made here is the double-fly Baluchistan tent ("fly" means the inner or outer top cover when roofs are doubly constructed), originally designed by Capt. A. H. McMahon, Revenue Commissioner of Baluchistan, and used by the Baluchistan-Afghanistan Boundary Commission. One of the most popular styles is the Swiss cottage tent, with a semicircular bathroom at the rear and a sheltered bay in front. For hill service, where lightness and easy portability are especially desirable, tents varying in size from 10 by 10 to 14 by 14 feet and weighing 570 to 730 pounds are much-used; also one known as the Bechoba tent, which weighs 420 to 500 pounds. Its characteristic feature is the absence of inside poles, the whole weight of the roof resting upon four external poles placed at the corners.

Many 2-pole tents are manufactured, one type consisting of a large oblong inner room, which, when supplied with division curtains, may be converted into three smaller rooms. A walled passage 4 feet wide surrounds the center room, and ample space separates the two flies, affording protection against both heat and cold. In some parts of India I have found even banking institutions (usually branches) temporarily housed in such tents. One interesting style, known as the tahsildars' tent, was specially designed at the request of the Board of Revenue of the United Provinces of India for tahsildars, or subordinate magistrates, to hold court in when on tour. Such tents are also much employed for shooting or light-marching purposes, and, in smaller modified patterns, with outer fly of green waterproof canvas, are largely exported to Burma, Straits Settlements, and Siam.

THE DURBAR AND OTHER STYLES.

The durbar tent, with square or rounded ends (3 poles and a double fly), is for durbars or other State ceremonials. The fly ridges are ornamented with red-cloth festoons and the poles end in large brass caps. A handsome dwelling tent, known as the Government of India pattern, was specially designed for the 1911 Coronation Durbar at Delhi. It consists of an office, a drawing room, two bedrooms, two dressing rooms, and two bathrooms, connected with the dressing rooms by passages. It weighs 1,600 to 2,600 pounds, in size is about 56 by 28 feet, and, like most of the tents previously mentioned, is made of four folds of cloth.

Military tents are of many varieties, and include officers' mess tents, which may be divided into a dining room and a waiting room, with verandas; some very light, single-fly mess tents; officers' light field service tents, some weighing 80 and some 40 pounds and fitted inside with pockets and ropes for hanging clothes, also sockets for guns, swords, etc. One service tent, designed by a British officer, Lieut. Col. A. G. Medley, can be used as either a tent or a bivouac; when used as a bivouac, the walls double up underneath, forming an effective ground sheet. It weighs but 20 pounds. Another tent, invented by Col. G. F. Young, of the British Army in India, weighs only 14 pounds and can be used as a tent, a sleeping bag, or as a valise for packing.

MISCELLANEOUS KINDS—PRICES.

There is large use of tents in India for cinematograph and circus purposes; for reception and refreshment purposes; for detached dining and reception rooms; for kitchens, servants' quarters, stables, etc. The Shamiana canopy is much used for entertaining, for race meetings, and the like, as is also the Marquee. The Chandnis, made with a striped frill about 15 inches deep, is used for Indian weddings. Octagonal tents are often erected for garden parties. An ingenious style of umbrella tent meets the requirements of officers engaged in survey work or rifle-range practice.

The tents have as wide a range of prices as of design—\$6 for the smallest and cheapest pattern up to over \$4,000 for large durbar tents. The Swiss cottage tents, which probably have the largest sale (except soldiers' tents) cost \$60 to \$100. In India it is customary for large numbers of people to distribute their time between a winter residence in the plains and a summer residence at the hill stations; many people also take their vacations in camping trips. Often hotel accommodations in remote parts of the country are either entirely lacking or, in comfort and sanitation, are inferior to tents. By the extensive use made of tents much money is saved to people in India every year in cost of construction or houses, and in fact were not Indian tents so comfortable and cheap, it would be difficult for many people to endure the discomfort and expense of traveling in India.

Manufacturing tents is an important industry in many prisons of India, the tent cloths at these institutions being usually purchased in England or in the United States, although there has been much agitation of late by cotton mills in India to induce the various local governments to use only local drills for prison-made tents.

POSSIBLE OPENING FOR CAMP FURNITURE.

With the use of tents in India there is also an important demand for easily portable furniture, much of which is purchased from the United States. Among the various kinds of camp or tent furniture used may be mentioned cots or beds, folding chairs and stools, folding tables, and folding washstands and bathtubs, beds and tubs leading. These articles are usually made of hardwood and canvas (generally white or green), camp beds frequently being provided with frames to carry mosquito netting, and all are so made that they can be folded compactly and packed in canvas valises.

A camp cot covered with waterproof canvas, with a height of 1 foot 8 inches, width 2 feet 6 inches, length of 6 feet 4 inches, and weighing 15 pounds, will cost about \$4.50 at Bombay. The mosquito frames will cost perhaps \$0.80 extra; the mosquito net of cheap quality about \$2.40, and best quality about \$3.50. A camp table, folding quite flat, and when folded 3 feet long by about 6 inches thick, and weighing 16 pounds, costs \$3.50. The top of it is 2 feet 3 inches wide and 3 feet long. Camp chairs of a more elaborate sort, made of hardwood and green canvas, will cost \$4.25 to \$6. Other camp chairs and camp stools will cost from \$0.65 to \$1.25. A bathtub 2 feet 6 inches by 2 feet 6 inches and 11 inches deep will cost about \$5. A washstand will cost about \$2.20. American camp furniture is rapidly gaining in popularity in India, and dealers say

it is an excellent selling line. The tents are usually lighted at night by kerosene lamps or lanterns, many of them of American make, especially storm lanterns for lighting the entrance. Fans operated by kerosene are much used for keeping the tents cool.

SILK INDUSTRY OF SALVATION ARMY.

Under the direction of Commissioner F. Booth Tucker, of the Salvation Army in India, former head of the Salvation Army in the United States, great progress is being made in establishing a prosperous silk industry at 15 localities in India and 2 in Ceylon. The Government of India has loaned to the army several advisory agricultural experts. One of the silk farms in Ceylon is connected with the Ceylon agricultural experiment station at Peradeniya. At the silk farm at Bangalore, Mysore, founded about 10 years ago, are 45 Indian students, of whom 12 hold Government scholarships, and after graduation will teach the industry elsewhere. At this institution mulberries are grown and silkworms reared, and bleaching, twisting, dyeing, and weaving are carried on. At some of the Salvation Army farms members of the Indian criminal tribes find employment.

RECENT PROGRESS.

The report for 1912-13 on the silk centers of the Salvation Army in India and Ceylon states that during the year under review about 70 ounces of French silkworm seed were distributed at the 17 centers. The report says:

We have placed an order for 300 ounces for the season of 1914. The scarcity of mulberry trees in many districts greatly retards our progress, and it will be some years before this difficulty can be overcome. Considerable areas are, however, being planted out by the Forest, Canal, and Public Works Departments, as well as by district boards, and increasing interest is being manifested in the industry. At the same time considerable experiments are being carried on. Until these have been considerably improved, they will not compare favorably with foreign varieties. The "grainage" or "seed" business is at present on a very unsatisfactory basis in almost all parts of India. It ought to be carried on by a separate set of rearers, as in France, and might then become in itself an important and lucrative business. Grainage, being thus a separate business, might prove attractive to those Hindus who object to the stifling of cocoons, seeing that the moths are allowed to emerge.

About 200 basins have been already established by us for the production of what is technically known as raw silk, and it is hoped before the close of the year to increase their number to at least 500 and during the following year to at least 1,000. This means that we shall soon be producing raw silk at the rate of about a ton per month and shall require a supply of more than 4 tons per month of cocoons. A large local demand for cocoons will thus be created and a ready market found by silkworm growers for their produce. It will be necessary for us for some time to come to import our supply of cocoons, as the local supply will probably not be sufficient for our needs, and the local cocoons are at present often inferior in quality and high in price. But with the improvement in the local supply, fostered by a strong local demand, the time may not be distant when India will yet take its place alongside China and Japan in the export of silk.

An interesting feature of the industrial work of the Salvation Army in India is its weaving school and loom factory for improved hand looms, warping machines, and accessories at Ludhiana, in the Punjab. More than 800 improved hand looms have been manufactured and sent out by the Salvation Army during the last five years to various places in India, Ceylon, the Straits Settlements, and British East Africa. The principal Government weaving schools in

India have accepted and introduced the Salvation Army loom and teach its use to their students. The warping machines manufactured enable weavers to make and beam warps from 100 to 1,000 yards in length. One of these machines will keep about 20 looms supplied with warps. A recent report by Commissioner F. Booth Tucker states that the greatest need of the Indian weaver is an agency which will put him in touch with the markets of the world, will secure for him advance orders, and will enable him to get the best returns for his labor. The Salvation Army, it is mentioned, will soon have such an agency established, which, it is believed, will revolutionize the position of the Indian weavers.

EXPORTS—AMERICAN PARTICIPATION.

The raw silk product of the Salvation Army in India is already being exported to England and Switzerland, and Commissioner Booth Tucker hopes that soon the army will have customers among the silk manufacturers of the United States. Any American manufacturer interested in this product may communicate with Commissioner Booth Tucker at the headquarters of the Salvation Army in Simla, India.

SILK GROWING AND MANUFACTURING IN BURMA.

[By Consul M. K. Moorhead, Rangoon.]

The natives of Burma, both men and women, wear mostly costumes of silk. The costume of the men consists of a long skirt, extending from waist to ankles, called a "longyee," a collarless shirt or "chway-gan," over which is placed the "aain-gyee," a coat somewhat similar to a pajama coat; and the "gaung-bound," a silk handkerchief tied around the head. This costume is usually of highly colored silk, the favorites being pink, red, and watered silks. The coat is often of white silk covered with embroidery. The cost of these costumes varies, according to the quality of silk used, from \$6.50 to \$25. The women's costumes are similar to those worn by the men, except that the skirt is much tighter and the silk handkerchief, instead of being tied around the head, is hung around the neck with the ends extending down the front of the body as far as the waist. The women do not wear any shoes or stockings, going either barefoot or with sandals without heels. The men of the present generation have adopted European shoes and hose, but cling to the rest of the native dress.

RAW MATERIAL IS IMPORTED—NATIVE MANUFACTURE.

Notwithstanding the almost universal use of silk by the Burmese, the cultivation and manufacture of silk have not been a financial success in Burma. Raw silk could be more extensively produced in Burma were it not that the Burmese population, being Buddhists, dislike to undertake the cultivation of the silkworm, because the pupæ of the insects have to be killed by boiling before the reeling of silk from the cocoons. Raw silk is, therefore, mostly imported from China and Japan. Small quantities of native raw silk are, however, produced within the Province. This silk, of dull yellow color, is

boiled in water about six hours until it becomes white. While still moist, the silk is spun onto wooden wheels, from which after drying it is transferred to the dyeing vats, where it is steeped and boiled again for another hour. German anilin dyes are used. An alkaline substance called sopaya (soap) is boiled with the dye. After drying in the sun, the silk is reeled again. It is then unraveled onto a hexagonal frame, supported on six uprights, called a "kya," from which it is transferred to the loom and woven by hand. About five days are taken to prepare the silk from the raw state for the loom. The silk is woven into paseos (men's cloths) or loongies (women's cloths).

IMPORTED GOODS MOST POPULAR—ARTIFICIAL SILK.

Future prospects of the silk industry in Burma are poor unless the industry be encouraged by outside demand or restored by the introduction of new and improved methods of production and manufacture. The Burmese silk is much coarser and heavier than the Chinese and Japanese silks, which are coming into more general use by the natives on account of their finer qualities, more brilliant coloring, and cheaper price.

During 1913–14 raw silk, valued at \$791,770, and silk piece goods, valued at \$1,986,570, were imported by sea into Burma, chiefly from China and Japan.

The receipts of piece goods of cotton mixed with artificial silk rose from 142,977 yards in 1912–13 to 161,115 in 1913–14. The technical difficulties experienced by weavers in artificial silk appear to have been definitely overcome, and as its employment in weaving is in consequence assured, a marked increase in its consumption may be anticipated.

MANUFACTURE OF CARPETS.

Next to the United Kingdom, the United States is India's best customer for its important manufactures of carpets and rugs. During the fiscal year 1913–14 India sold to the United Kingdom 1,354,532 pounds of woolen carpets and rugs, valued at \$582,233, and to the United States 99,769 pounds, valued at \$66,034. These figures, however, are considerably below those for the fiscal year 1911–12, when India exported to the United Kingdom 1,693,091 pounds of woolen carpets and rugs, value \$653,165, and to the United States 112,797 pounds, value \$94,450. It is likely that many of the carpets exported to the United Kingdom were eventually reshipped to the United States. The American demand is always an important element in the prosperity of the Indian carpet trade.

Indian carpets are, in the main, composed of a woolen pile on a cotton warp. There are certain centers where carpets entirely of cotton are made; woolen warps with silk pile are occasionally made to special order, and some of the old Mogul examples have a silk warp with a fine woolen pile. The quality of the wools and cottons used is, of course, an important consideration in carpet manufacture, and different centers have different sources from which the supplies are obtained. Generally speaking, the carpets of India can never excel those of Persia, where the materials used are of superior quality. The wool of which many of the best carpets are manufactured is obtained from Kashmir. Sometimes carpets which are mis-

taken for silk are really of an extremely fine quality of wool known as "pashm." This is obtained from the goats of Kashmir and grows close to the skin, being protected by the long and coarser wool. It is as smooth and lustrous as silk and is used for the beautiful soft shawls for which Kashmir is famous.

STYLE OF LOOM—WEAVING METHODS.

Practically the same kind of carpet loom is used all over India. It consists of a vertical frame of two upright beams fixed into the ground, 12 or 14 feet apart. Between these beams is a pit 3 feet wide and of the same depth, in which the weavers sit or dispose their legs when beginning the carpet. The upright beams are 6 to 10 feet above ground. Between them, at the top and bottom, are fixed two horizontal beams, capable of being turned by a lever, and between these beams the warp is stretched. These warp strings are formed into a back row and front row, and, by a simple but ingenious arrangement of rods, are made to interchange as required by the weaver.

The operator, sitting in front of the warp strings, passes in between them short pieces of woolen yarn of the required colors, making them fast by a kind of tie. The loose ends of this yarn are cut off with a knife about an inch from the web. As each row of such ties is completed, two or three weft threads of cotton or woolen yarn are woven in, forming the basis of the fabric and at the same time binding the pile. The next step is to beat down both ties and weft with a kind of comb called "hangi." From time to time the pile is clipped over with a pair of shears to form an even surface, and the portion thus clipped is wound on the lower beam, the warp wrapped on the upper beam being unrolled to a corresponding extent. In this manner, stitch by stitch, the carpet is gradually built up, until, after generally a matter of months, varying according to the size and closeness of the threads, the fabric is finished.

The quality of the finished article depends, naturally, on the quality of materials, workmanship, etc., but also to a great extent on the number of stitches to the inch. This is gauged by the number of warp threads on the loom, 8, 12, or 16 to the inch being the usual number at most carpet centers in India. In some localities a smaller number of threads is customary, while in response to special orders the carpet firms of Amritsar, Agra, and elsewhere will make up to 20 stitches, and sometimes over this number.

HOW THE PATTERN IS WROUGHT.

Peculiar methods are employed by the Indian weaver in converting his original design into a textile. Instead of working from a colored drawing or diagram, the weaver has the pattern translated on paper into rows of symbols, each of which expresses the number of stitches and the color. With this written "key" in his hand, the head weaver sits behind his subordinates and dictates the pattern to them, one row at a time, all through the breadth of the carpet. These weavers—generally quite small boys—sit in front of the warp strings and tie in the requisite number of stitches of each color as called out to them by the reader from his ciphered scrip. These boys, who perform

the actual process of weaving the pile, follow day by day the dictations of the head man, knowing nothing of the pattern they are preparing, but gradually building up in a mechanical way the carpet on the strings before them.

USE OF CHEMICAL DYES.

While the colors of old Indian carpets were obtained from the best vegetable dyes, together with one or two animal products, many of the colors now are from mineral dyes—aniline or alizarin. A few well-known firms still use the old dying method. As chemical dyes give the carpet makers a much greater variety of colors to work with, this innovation might be beneficial were it not that the chemical colors now mostly used by the dyers of India are of inferior quality and the workmen are frequently ignorant of the exact process required to fix them.

AMRITSAR CENTER OF TRADE WITH UNITED STATES.

The center of carpet industry in India which specializes on American trade is Amritsar, in the Punjab. The industry here owed its origin to the initiative of the jails of the Punjab, which first brought Indian carpets to the notice of the outside world at the London International Exhibition of 1851. Carpet making as a jail industry is still largely practiced in many parts of India. The Amritsar carpet trade is now almost entirely with the United States, and reached its present dimensions about 1898. An unexpected boom inflated it to twice its ordinary volume in 1900–1902. The result was overproduction and much bad work; the demand subsided, and the mushroom factories that sprang into existence had to close. The industry is now safe in the hands of a few firms of standing that practically monopolize it.

The leading manufacturers at Amritsar restrict their output to the higher grades. There are six factories in Amritsar, with about 200 looms actually at work, and some of these factories have branch establishments at other places. The manufacturer pays the master weaver for different qualities of carpets at so much per 1,100 stitches, and the latter in turn engages his weavers, mostly youths between the ages of 10 and 20, at a daily or monthly wage. A master weaver earns \$3.30 to \$10 per month and a weaver \$1.30 to \$5. All workmen are Mohammedans, the largest proportion, especially in the higher grades, being Kashmiris. Apprentices are, however, freely taken from other Mohammedan castes. Woolen yarn at Amritsar is locally spun, and dyed with vegetable colors. The finest wool used comes chiefly from Bikaner, in Rajputana, or from Kerman, in Persia, by the Nushki trade route through Baluchistan.

FOREIGN RUGS IN BRITISH INDIA.

Rugs from centers beyond the British border have for many years found their way into northern India. For their quality of texture and beauty of pattern they are much sought after, and a considerable trade has been established, especially at Peshawar, in northwestern India, and at Quetta, in Baluchistan. These rugs come from Persia, Russian Turkestan, and some from Afghanistan.

KNIT GOODS IN MADRAS.

[By Consul Nathaniel B. Stewart.]

There are no accurate figures available showing either the quantity or value of knit goods imported into the Madras Presidency annually. According to information received from the local customhouse all knit goods of whatever kind imported have heretofore been classified under the head of hosiery. One of the largest Madras importers of knit wear of all kinds estimates that the total value of such goods brought in now reaches at least \$75,000 annually, and the quantity, he says, is slowly increasing. The greater part, therefore, must always have been classified either as apparel or as haberdashery.

No attempts have ever been made by American firms to enter the market. The greater part of imports of such goods have always been from Great Britain. If proper efforts were made both American knit underwear and hosiery would probably find ready sale, provided articles superior to the English makes could be supplied at the same prices. Ladies' light-weight cotton combination knit suits, of which a few imported from America have constituted the only goods of the class from there, have proved quite popular. Only goods of lightest weight for either men or women can be worn in this part of India because of the extremely warm weather during the entire year.

Owing to the fact that the great mass of the population of the district is too poor, as a rule, to purchase knit clothing, it is not likely that there will ever develop a very large sale in any line. But the market will increase slowly as the country progresses, and American manufacturers should not let the fact that they can do only a small trade prevent their securing any part of it.

AFRIDI WAX CLOTH.

While visiting Peshawar, on the Northwest Frontier of India, I was much interested in a local production, known as Afridi wax cloth. This is a cotton fabric decorated with a waxy substance called "roghan"—a preparation obtained from the wild safflower plant—by Afridi tribesmen who inhabit mountainous districts in the neighborhood of the famous Khyber Pass between India and Afghanistan. Attractive specimens of this work are offered in the bazaars of Peshawar and other cities of northern India for as low as 33 cents. On visiting the Lahore Museum of the Punjab, at Lahore, I observed some interesting specimens. The following description of the industry appears in the Guide Book of the museum:

The production of what is known as Afridi wax cloth is one of the most interesting of all the art industries of India. It is the process of decorating a piece of cloth with patterns drawn in a substance known in India as "roghan." This "roghan" is composed of the oil expressed from the "polli" seed (wild safflower, or *Carthamus oxyacantha*), which, after being boiled for 12 hours, is thrown into cold water, when it assumes a new form and becomes a thick gum. With this are mixed any required colors, yellow being obtained by orpiment, red with red lead, white with white lead, and so on.

The worker takes a piece of the colored "roghan" in his left hand, and with an iron style in his right gathers up sufficient of the substance to form a dangling thread from its point. This hanging end of "roghan" he applies to a piece of cloth, and, moving the style in the direction of the pattern, draws out the thread in the form of a stringy line wherever he wishes it to go. Briefly, the process corresponds to drawing a pattern in thick treacle by means of a skewer. When the "roghan" he has collected on the style is exhausted he gathers up a fresh supply from the piece in his left hand—which may be referred to as his palette—and continues with the design.

DEXTERITY OF WORKERS—PATTERNS.

The ease and rapidity with which the worker draws out the required pattern with the long stringy thread dangling several inches from the point of the style must be seen to be appreciated.

As this line of "roghan" is applied to the cloth it is fixed in its place by the tip of the moistened finger being dabbed all along its length. This flattens out the thread somewhat, making a broader line, and also causes it to adhere firmly to the surface of the cloth. In the case of flowers it enables a shapeless drop of the "roghan" to be pressed into the resemblance of a petal. The cleverness with which the substance is manipulated and the variety of shapes that the worker can produce with a spot or thread of "roghan" and a dab of the finger are not the least wonderful parts of the art.

Apart from the colors obtained by the "roghan" other rich effects are produced by the pattern, before it is dry, being dusted over with powdered mica to give it a silvery glitter or gold leaf or imitation gold and silver is similarly applied. After an hour or so, when dry, the "roghan" becomes quite permanent and will stand almost any amount of brushing and washing.

The art is mainly carried on in the towns of northern India, such as Peshawar, Lahore, Simla, etc., but it is also to be found in a slightly modified form in Kach and Baroda. Wherever the cloth is made its production is almost invariably in the hands of Afridis, hence the name. The industry is believed to have been practiced from early times in the Afridi country, principally in the ornamentation of shawls and other garments worn by females. Some fairly old patterns of work are to be seen at the Lahore Museum, together with a few specimens of modern workmanship. The difference in the two styles is most striking. The latter show considerable traces of Japanese influence, and are usually found on tablecloths and articles of a similar nature.

WOOLEN GOODS.

During the official year 1913–14 woolen goods constituted 5 per cent of all yarns and textile fabrics imported into India, the respective values being \$13,144,694 and \$245,077,144. Out of a total of 27,328,772 yards of woolen piece goods the United Kingdom supplied 18,612,213 yards and Germany 4,871,312; Germany led, however, in shawls, sending 1,594,939, against 312,572 from the United Kingdom, the total imports numbering 2,100,748. Imports of woolen hosiery advanced from 471,965 pounds in 1912–13 to 537,280 pounds in 1913–14, the United Kingdom supplying 454,577 pounds. Those of woolen yarn increased during the same period from 948,350 pounds to 1,058,855 pounds, Germany sending 688,352 pounds.

The production of the Indian woolen mills rose from 4,781,800 pounds, valued at \$1,701,300 in the calendar year 1912, to 5,150,000 pounds with a value of \$1,146,600 in 1913.

Exports of woolen manufactures from India in 1913–14 were valued at \$814,404; these consisted principally of rugs and carpets, valued at \$746,745, and shawls, valued at \$13,067.

LOCATION OF WOOLEN MILLS—HAND WEAVING.

The chief centers of the woolen-goods manufacturing industry of India are found in the Punjab and in the city of Cawnpore in the United Provinces. Among the native population of India it is said that the demand for woolen goods is best in the Punjab, where habits of dress correspond more with European fashions. Moreover, in all districts of India adjacent to mountainous or hilly country the demand for woolen goods, because of the colder climate, is much better relatively than in the lower and hotter districts where cotton goods are worn almost exclusively. In the cloth market at Bombay it is said that by far the best demand for woolen goods is from up-country

districts, especially from the Punjab, and buyers from those districts purchase in Bombay, just as European tailoring establishments in Bombay will purchase directly in London, through their buying agents at that emporium. It is interesting to note that wool manufacturing in India is almost entirely carried on in districts where the local consumption has habitually been largest.

In the Punjab the chief wool markets are Fazilka, Lahore, Multan, and Darya Khan. The material is brought to these places by road or rail, and after being cleaned, pressed, and baled, is shipped to Dhariwal, the leading wool factory center of the Province, or is exported to Europe and America. At Dhariwal the industry is controlled by the new Egerton Woolen Mills Co. (Ltd.), which has mills situated on the Bari-Doab irrigation canal. These mills are worked by water power, supplemented by steam during canal closures. The staff includes 14 Europeans who manage the industry, in addition to over 1,000 hands recruited from surrounding villages. The mills here make use of not only local and transfrontier wool but also considerable Australian wool. The Indian Army Police and other Government departments are large purchasers of its goods, which include manufactures of high-class hosiery, worsteds, and woolens.

RAW WOOL.

Raw wool imported by sea into India during 1913-14 amounted to 3,749,401 pounds, of which 2,732,260 pounds came from Persia, 522,859 pounds from Australia, and the remainder from the States in Arabia along the Persian Gulf and from the United Kingdom. The exports of wool from India during this year amounted to 48,922,061 pounds. The United Kingdom took 97 per cent of the quantity exported and the United States nearly 2 per cent. Considerable of the wool included in these figures comes from beyond the land frontiers of India, especially from Afghanistan and Tibet, but reexports of wool received by sea are not included. Imports of raw wool from land frontier countries were valued at about \$4,124,000.

Among the chief sources of wool supply in India for local manufacture are the Punjab, the Northwest Frontier Province, and several Native States in Rajputana, including especially Bikaner and Jodhpur. Bikaner wool is said to be the best for woollen manufactures of any grown in India, notwithstanding it is generally full of burr, which largely detracts from its value. It is said, however, to have the peculiarity of not requiring to be washed before spinning. Most of the wool raised on the plains of India is of poor quality, being coarse, dirty, and short stapled. Wool from Tibet is much used, especially by the Cawnpore mills. It is said to be entirely free from burrs and to have a longer and more uniform staple than Indian wool, but as an objection it loses 25 per cent of its weight in washing and is marred by the presence of an excess of dead hairs. In worsteds, Tibetan wool is said to hold the first place in importance. Of late there has been considerable complaint that the Dalai Lama at Lhasa has given the monopoly of the Tibetan wool trade to a certain Tibetan trader (Pang de Zong).

An important hand industry in wool is also carried on by weavers in this Province, whose products include chiefly coarse but durable

blankets, some partly of cotton, long narrow pieces of rough cloth, flannels and tweeds from imported yarn, and a small quantity of shawls, hosiery, etc. The blanket industry is scattered all over wool-producing districts in this Province and other parts of India. Almost all native hamlets in such districts have looms, and blankets of home-grown wool are in common use. There is also some production of woolen horse cloths for the Indian Army, and also of such articles as rugs, prayer carpets, and camel trappings. The returns of such hand industries are said not to exceed from 8 to 12 cents per day, and it is said to be increasingly difficult for these weavers at home to compete with cheap, shabby articles from Europe. At Amritsar in the Punjab, which is noted for its woolen-carpet industry, there is also considerable production of cheap flannels and tweeds from woolen yarn locally known as "raffal," from Europe.

LARGE MILLS AT CAWNPORE.

Although the Punjab is noted for its wool trade and more or less attention is given to local production of various kinds of woolen goods, as above explained, yet by far the most important single organized wool industry is that which is located in the city of Cawnpore, in the United Provinces. The industry there is carried on by a company widely known in India, the Cawnpore Woolen Mills & Army Cloth Manufacturing Co. (Ltd.), established in 1876, which has a plant dealing with over 15,000 pounds of raw wool daily and employs 2,000 hands. By an extension which has just been completed, costing about \$100,000, it is understood the capacity will be largely increased; still other extensions are contemplated. The original capital invested in these works was only about \$65,000, but by the steady development of the works, the capital now invested amounts to about \$1,500,000. In its early days this concern manufactured principally the coarser qualities of blankets, but now its production includes almost everything made of wool.

It was explained to me recently while visiting this plant, that whereas woolen goods manufacturers in England and other countries specialize on certain classes of articles and processes and are thus able to reduce their manufacturing cost, manufacturers in India are obliged to maintain an equipment for turning out from beginning to end everything made of wool which they might be called upon to supply, so that the Indian purchaser may be in a position to obtain any article made of wool without the slightest dependence on importations. The factory at Cawnpore consequently embraces not less than eight different departments.

The Cawnpore mills not only do a large business throughout India, but are also at present finding markets for their products in other parts of Asia, as Persia, Arabia, and Turkey. A certain amount of business is done for customers on special specifications. In some other cities of India, such, for instance, as Bangalore, in the Native State of Mysore, woolen goods are manufactured largely in connection with cotton goods, such double arrangement apparently proving advantageous. Railways and police departments are large purchasers of woolen goods as uniforms for employees.

MARKET FOR WOOLEN GOODS.

The Hindu population of India have always considered wool a ceremonially pure material, and have been acquainted with it from the remotest time, but in comparison with cotton goods its use has been restricted to a great extent on account of its comparatively high cost and the fact that in the plains at least they find it is too hot during the greater part of the year to make it popular. Its use, however, seems to be extending, at least among the more well-to-do native classes who are inclined to imitate European methods of dress.

The trade in woolen goods, through European tailoring establishments in India, is mainly on the basis of English fashions, but the textures of cloth, in view of the warm climate of India, are as a rule rather light. There is considerable trade by tailors and general dry goods establishments, especially in gentlemen's hosiery, underwear, sweaters, jackets, broadcloth dress suits, flannel shirts, pajama suits, and traveling rugs. These firms cater very largely to Government employees (military and civil), business people, and higher class natives, and especially to persons going to hill stations. The Parsis in Bombay, of whom there are about 25,000, mostly quite well-to-do, for the most part wear European dress, excepting headgear.

While most of the woolen goods sold in European establishments in India are purchased either through their buying agents in London or at Cawnpore, in the case of woolen goods for native trade such as are sold in the great cloth markets at Bombay, Calcutta, and other cities, the sales are effected mostly through the services of commercial travelers.

REMNANTS AND CUT PIECES.

An Indian firm in Delhi wrote me:

You are probably aware that within the last few years the imports of remnants and cut pieces from England are falling off, as the trade has passed into the hands of Russians and other alien dealers in London and provincial towns. We observe that the best prices obtainable are for consignments of English remnants which are really of American manufacture. We also observe that whole pieces of excellent quality are included by American dealers in their parcels of remnants, and presume this is due to the rapid change of fashions in your country which leave large quantities of the best goods on the shelves of your stores.

In order to secure a little more information concerning this interesting business, I wrote to this Delhi merchant as follows:

I would be glad if you could kindly supply me a few more details concerning this trade in India and the uses to which remnants are put, as I would like to write a short special report concerning the matter, which would insure a certain amount of publicity and probably be the means of getting you in touch directly with more American firms than might otherwise be the case. I presume you mean by remnants left-over pieces of various classes of dry goods, including cotton, woolen, and silk cloth, laces, ribbons, etc.

To this letter I have received a reply as follows:

We are highly obliged to you for your kind letter and the interest you have taken in our work. The business in remnants is rising day by day in India, and Delhi is the center of the same. Goods are supplied through Manchester, but we see that now your American merchants have also started a direct business in India. By remnants we mean left-over pieces of all sorts of cotton, woolen, and silk cloth. There is not much business in laces, ribbons, etc., but there can be some if they are exceptionally cheap. Remnants are also those that are left unsold, being out of fashion on account

of the designs and shades that are changing so very often. Such goods, on account of their being very cheap, are used by poor and middle classes of people, who are extremely numerous in India.

BLANKET TRADE IN BURMA.

[Consul Maxwell K. Moorhead, Rangoon.]

With the Belgian and German supplies shut off, the United States should be able to get a share of the blanket trade. The value of the imports of cotton blankets into Burma by principal countries during the years ended March 31, 1913 and 1914, were as follows:

Countries.	1912-13	1913-14
Germany.....	\$289,210	\$550,310
Belgium.....	116,240	330,050
Netherlands.....	202,260	328,990
Austria.....	8,280	22,870
United Kingdom.....	7,300	20,250
All other countries.....	330	6,720
Total.....	623,620	1,269,190

APPAREL.

SHIRT AND COLLAR TRADE.

[By Consul E. J. Norton, Bombay.]

There seems to be a very limited demand in Bombay for men's ready-made shirts; dealers invariably state that made-to-order garments are wanted in preference, although the former may be of the same pattern and quality of material and identical in measurement. As a result, light stocks of good quality ready-made shirts are carried, and the import trade in this line consists almost exclusively of linen dress garments which are required to meet the demands by travelers.

Local dealers are prepared to supply all demands for custom-made shirts. English cutters are employed by all the principal firms; cheaply paid native tailors are readily obtainable, and under the supervision of a European they turn out excellent work.

As regards competitive prices, the tailoring department of the Army and Navy Stores, one of the highest-priced shops here, will make dress shirts to order as follows:

	Per dozen.
Fine longcloth, with linen fronts and cuffs, quality 1, with 1, 2, or 3 stud front..	\$14. 27
Fine longcloth, with 3-fold Irish linen fronts and cuffs, quality 2, with 1, 2, or 3 stud front.....	16. 70
Fine longcloth, with superior 3-fold Irish linen fronts and cuffs, quality 3, with 1, 2, or 3 stud front.....	19. 94
Superior fine longcloth, with best 4-fold Irish linen fronts and cuffs, quality 4.	22. 54
Extra fine longcloth, with best 4-fold Irish linen fronts and cuffs, quality 5, with 1, 2, or 3 stud front.....	24. 33
Any of the above with collars attached, extra.....	2. 75

Single shirts made to order are sold at dozen rates. Custom-made negligee shirts in fancy Madras or striped print zephyrs are made to order from \$0.92 to \$1.44 each; made from best quality flannel with turned-back cuffs, \$2.25; and in twill or cellular material from \$0.46 to \$1.50.

THE COLLAR TRADE.

Sales of linen collars of the best quality are limited in volume as the demand proceeds purely from the European population. The best linen collars, British made, cost \$2.25 per dozen. Collars with facings of pure linen and other portions consisting of mixed linen and cotton sell for \$1.55 per dozen. There is a large and growing bazaar trade in cheap collars imported from Austria, a staple line of exports that the United States can not compete against in price.

EUROPEAN INFLUENCE IN DRESS.

The adoption of European dress, or at least certain articles of European dress, by a large number of people is one of the marked features of the change in Indian tastes. A great many Hindus of the higher caste now wear European shirts, coats, and trousers. When

the Hindu retains the fine cotton dhoti as a leg covering, the European is shown in the cut and texture of the coat that covers the upper part of the body, and the shirt and collar that are to be detected underneath.

MESH UNDERWEAR. AN IDEAL CLOTHING FOR INDIA

"Cool as a Cucumber."

We have after exhaustive tests found a garment which meets with absolute approval from all our customers who wear light weight cotton underwear.

IT IS MADE IN AMERICA in one of the largest factories in the States and who produce only this one garment and as a result have brought their costs of making it down to the finest margin.

IMMENSE INDENTS are placed for all our branches in the East and we are confident we offer value unequalled by any other firm.

IT IS
Light in weight. As soft as silk.
It wears like linen. Washes
beautifully.

'Your Hot Weather Garment'
Vests or Knicker Drawers.

Re. 1 each. Re. 1 each.
3 for Rs. 2-15. 3 for Rs. 2-15.

Call and see these in our Men's Wear Section.

FIG. 14.—Advertisement of American underwear in Bombay newspapers.

This change is not likely to enlarge the market in India for shirts of foreign manufacture. Apart from the fact that the men do not like ready-made garments, dealers state that their customers require shirts made according to their own individual tastes. For example, shirts are ordered made with linen bosoms and turned-back soft cuffs.



Again, as regards the depth and shape of the cuff, the length of sleeve, and the fullness of the body of shirts, the natives are most particular.

American mesh underwear of the kind illustrated in figure 14 is popular with European residents in India on account of its light weight for the hot climate, and its allowing ventilation of the skin. It is being much featured by department stores in India in their advertisements.

There are no jobbers of men's furnishings in Bombay, but there are a number of large retail firms.

[By Consul José de Olivares, Madras.]

CHARACTER OF TRADE IN SOUTH INDIA.

The importation of shirts into South India is relatively much smaller than that of collars, as shirt making is a trade engaged in by many native Indians, who adroitly copy at comparatively low prices the most approved styles in imported shirts. Notwithstanding this, there is a fairly large importation of custom-made shirts, most of which come from England, while some are imported from France.

Among the favorite brands of imported shirts sold hereabout are the "New Opera" English dress shirts, which retail at \$1.50 each, and the "coat" shirt, retailing at \$2 each, both of which are made from white longcloth with linen front and cuffs. The "Levee," a dress shirt made from longcloth with French plaited pique front, retails at \$1.85, and the "Spa," a colored negligee shirt with plaited front, retails at \$1.60 each.

Collars sold hereabout are chiefly English, German, and French importations, and embrace a large number of brands, such as the "Perfection," "Baden-Powell," "Fitzwilliam," "Gondola," "St. Andrews," "Tokio," etc., retailing at from \$2.30 to \$2.45 per dozen. In addition to the foregoing there are cheaper grades of imported collars obtainable here, retailing as low as \$1.85 per dozen.

I have been informed by local haberdashers that a market might be created here for American-made collars and shirts, because of their smart appearance, provided the prices were sufficiently low to permit of their competition with European goods.

CORSET TRADE.

A recent interesting development in the corset trade of India, in which the United States has the most important share, is that native women of high caste—known as purdah women, because they keep their faces covered with purdahs, or thick veils, and live a life of seclusion from the male sex—are beginning to wear corsets, the same as their European sisters, and are now furnishing a new class of customers for such articles.

These purdah ladies rarely leave their homes except in carriages closely curtained. They often drive to European shops, but do not enter, the goods being brought to them for inspection in the carriages either by their husbands or by female attendants. These ladies often have "purdah parties" among themselves, when, although no men are present, they vie with each other in dress, ornaments, and pleasing fashions generally. For corsets to be the vogue with them is an innovation. In buying corsets, it is said, they choose what they

understand to be the most up-to-date fashions in Europe or America, and buy as good a quality as their means will permit.

Leading shopkeepers in India have informed me that among all classes who wear corsets at all, including European, Eurasian, and, more latterly, high-caste Indian ladies, American corsets prove much the best sellers. They like especially the variety of models and sizes of the imported lines from the United States, and also the system of "style numbers," since once they have determined on the particular shape and size most suitable to their figure they can thereafter order additional pairs without any bother or delay by simply referring to the particular style number.

STYLES AND PRICES.

The local shops dealing in American corsets usually have about a dozen different styles to offer their customers, in sizes from 18 to 38 inches waist measure. Some of the American corsets here sell up to about \$9, but the average price is \$1.80 to \$2.35. Some corsets, however, are sold as low as \$0.60 a pair. One such, known as the Chic-Fit, is said to have a sale running into thousands a year. It is a copy of some of the most popular and more expensive models, and is made of a light-weight batiste, trimmed with lace at the top, and fitted with front hose supporters.

Generally speaking, the European women of India heartily approve the American idea of making corsets as hygienic as possible, and also like American patterns, because they give a graceful and slender appearance to the figure, as well as for the fact that they are not too tight at the waist. Corsets with low bust, not offering restraint above the waistline, and with hips showing slender, symmetrical lines are the general types now most desired here. Such corsets for this trade may be lace trimmed at the top, with hose supporters at the front and sides. There is considerable extra demand, however, for hose supporters, as the rubber in them shows a tendency to wear out quickly under Indian climatic conditions.

European women residing in India are noted for their fondness for outdoor sports, especially horseback riding and lawn tennis. A large number of them belong to military social circles in which open-air amusements constitute a leading feature of their daily life. There is, therefore, among these ladies an especial demand for corsets suitable for riding and other athletic exercises. These, however, are changed for more elaborate corsets for social functions in the afternoon and for the evenings, when social custom in India prescribes full dress.

CLIMATE AFFECTS DEMAND.

The climate of India in the plains is warm all the time, and in the summer the temperature there may often reach 120° in the shade, so that lightly-built cool corsets are desired. Many Europeans spend their summers at hill stations, chiefly in the Himalaya Mountains, where at elevations of upward of 7,000 feet above sea level the climate is naturally much cooler than on the plains; yet even there it is often very hot in the middle of the day, while at times when it is cool the ladies may be exercising, so that even then they still like

cool corsets. Generally speaking, the climate being warm and yet changeable, and social life, in addition to the warm climate, making frequent changes of garments desirable, it is natural that women should require more pairs of corsets here than in cooler climates and in countries where there is less social necessity for frequent change of costumes, and also that the sorts of corsets required are those made of the lightest and thinnest materials. While special models are needed for athletics as well as for modish afternoon and evening gowns, and while the well-dressed woman in India must purchase a greater number and variety of corsets than in many other countries, yet, for the very reason that she requires so many, they must be economical in price.

Indian women of the native classes, except the high-caste purdah women already mentioned, do not wear corsets, and probably never will, as they would doubtless consider them a most extravagant and uncomfortable luxury. It appears to be a cardinal principle of feminine economy among the native women of India, except those of the highest classes, that there is no sense in spending money on any article of apparel which is not actually required for warmth, respectability, or as a contribution to outward adornment, and they apparently can not see any object in expenditure on corsets, lingerie, stockings, etc., which would not be visible parts of their costume.

HOSIERY TRADE.

The Director of Statistics of the India Government states that India's import trade in hosiery has been practically monopolized by Japan and Germany, and now it would appear that Germany's share of the trade would go to Japan. In 1913-14 Japan supplied hosiery to India to the value of \$2,739,000, while hosiery to the value of \$1,419,000 came from Hongkong and the Straits Settlements, and hosiery to the value of \$759,000 came from Germany. The Director of Statistics says that Japan's share in the hosiery trade of India is about twelve times that of the United Kingdom. In fact, Japan's best customer in the hosiery trade is British India, 70 per cent of the Indian imports being from Japan, whereas 10 years ago Japan supplied only 10 per cent of the Indian requirements.

UMBRELLAS AND WATERPROOF GOODS.

Umbrellas constitute one of the most important articles of import into India, as they are used by Europeans and natives. While their use is largest during the monsoon periods, they are also employed to a great extent, especially in southern India, for protection against the tropical sun. Among well-to-do natives, like those belonging to the Parsi community in Bombay, for whom custom and race traditions prescribe a style of headgear that does not give adequate protection against the sun, as do the topees or sun hats worn by Europeans, umbrellas are commonly carried in fair as well as rainy weather.

During the year ended March 31, 1914, India imported umbrellas and umbrella fittings to the value of approximately \$1,718,000, the larger part of this being \$1,022,000 worth of fittings for the local manufacture of umbrellas. The total number of complete umbrellas, including parasols and sunshades, imported during the fiscal year

1913-14 was 1,967,560, of which 1,561,532 came from the United Kingdom. There was a considerable increase in imports over the preceding year, when the total number imported was 1,556,490. Undoubtedly the use of umbrellas in India is constantly extending, as the native classes, whenever they can afford it, are quite ready to imitate Europeans in the use of such articles. Few articles of import so readily appeal to the natives as umbrellas.

THE SUPPLYING COUNTRIES.

Statistics in detail as to the countries from which umbrellas and fittings were imported into India in 1912-13 and 1913-14 are given in the following table:

Countries.	Umbrellas and parasols.				Umbrella fittings.	
	1912-13		1913-14		1912-13	1913-14
	Number.	Value.	Number.	Value.	Value.	Value.
United Kingdom.....	1,218,146	\$497,126	1,561,532	\$612,614	\$400,917	\$370,528
Hongkong.....	173,107	14,672	220,610	18,498	1,114	1,114
Straits Settlements.....	63,262	9,164	45,913	6,794		
France.....	49,142	29,102	57,835	31,438	1,027	2,467
Germany.....	11,450	7,787	12,815	5,996	230,858	300,025
Belgium.....					69,061	117,755
Japan.....	6,223	2,998	8,418	2,180	137,284	218,822
All other countries.....	35,160	10,344	60,437	18,516	16,274	11,548
Total.....	1,556,490	\$71,193	1,967,560	\$66,036	855,421	1,022,257

In 1913-14 the number imported into different Provinces was as follows: Bengal, 689,632; Bombay, 249,831; Sind, 3,996; Madras, 148,746; Burma, 875,355.

QUALITIES AND PRICES.

Most of the umbrellas sold in India are of cotton material, with common wooden handles. They can be obtained in the bazaars for as low as 40 cents apiece and somewhat better qualities up to about 75 cents apiece. There is a smaller demand from a better-class trade for half-silk and half-cotton umbrellas, which average about \$1.60 apiece. The sale of all-silk umbrellas is quite small. Generally, India affords a big market for the cheapest grade of umbrellas, and when prices are low enough a good business can always be done.

CLOTHING SUPPLIES.

There is also a fair trade in India in waterproof clothing, the imports for 1913-14 amounting to \$80,776, as against \$57,880 for the preceding year. Waterproof clothing, like umbrellas, meets with an urgent and increasing demand during India's monsoon seasons. Waterproof coats and cloaks sell at \$1.50 up to \$15 apiece, according to size and quality. Usually dealers order from the manufacturers about a year before the date of delivery, as generally the more time allowed manufacturers for execution of the orders the cheaper they can be obtained. Orders are usually sent in for the ensuing year shortly after the monsoon season has started. At this time dealers

are in a position to know whether or not they will have much unsold stock left over, the demand, of course, depending considerably upon the intensity of the monsoon and also upon the general trade conditions.

The big demand may be expected during the early days of the monsoon, during the latter part of June or the early part of July. The newspapers of India at this time are especially full of advertisements of all kinds of waterproof apparel as well as umbrellas. One leading department store of Bombay advertised the importation of 3,500 rain coats for the past monsoon season. England supplies practically all waterproof apparel used in India, and resident Europeans are the chief purchasers. The cheapest class of goods they purchase for their servants. Among most coolies and agricultural laborers who are obliged to work outdoors in rainy weather, the chief protection from the rain consists of coarse woolen blankets that are folded to make a kind of hood over their heads and a cloak over their bodies. While such blankets are not impervious to water, they lessen the disagreeable effects of the heavy rains.

METEOROLOGICAL CONDITIONS.

The annual visitation of the monsoon in India is of supreme importance as regards every trade and industry. During the actual pendency of the monsoon the weather conditions do not favor the retail stores, as women especially do not frequent shops much at this period, except to buy necessary articles. The unusual demand at this season for umbrellas and waterproof garments compensates shopkeepers to a great extent for the slack trade in other lines.

The need of special protection from the wet monsoon period may be understood when it is mentioned that the total rainfall from June to September amounts to 100 inches over parts of the west coast, in Assam, and in Burma; and in most populous parts of India it is over 20 inches during this period. The monthly distribution, in inches, for the whole of India is: May, 2.60; June, 7.10; July, 11.25; August, 9.25; September, 6.78; October, 3.15.

Scarcely any rain falls in India outside of the monsoon period. About the middle of September fine and fresh weather begins to appear in the extreme northwest of India. This area of fine weather and dry winds extends eastward and southward, the area of rainy weather at the same time contracting till by the end of October the rainy area has retreated to Madras and the south of the peninsula, and by the end of December has disappeared from the Indian region, fine clear weather prevailing throughout. This procession with the numerous variations and modifications that are inseparable from meteorological conditions repeats itself year after year. During the monsoon season, even when there are temporary intervals of sunshine, the weather conditions are so uncertain that it is never advisable to go outdoors long without being provided with umbrellas or waterproof clothing.

FOOD AND DRINK.

PURE FOOD GOODS.

[By Consul James Oliver Laing, Karachi.]

An important step is being taken by the British Food Society to guarantee the Indian public a supply of pure food. At present there is adulteration of many foods and harmful preservatives are in use. In an interview recently the secretary of the society said that "analyses by an independent body named will be to the interest of firms supplying food or drink to qualify for this certificate of purity. The examinations will be frequent, and the quality of the articles will thus be constantly tested."

The society has asked the British (Government) Board of Trade to license a design to be used as a kind of hall-mark of the purity of food products which has passed the British Analytical Control. The device suggested is triangular in shape with the words "Under seal" at the base. Above and in the center is an open book inscribed "We will have pure food." This will be used on four divisions of articles as follows: Substances used as food or as ingredients of food (including milk); fermented liquors and spirits; chemical substances prepared for use in medicines and pharmacy; and mineral and aerated waters, natural and artificial (including ginger beer).

Several large stores here carry many kinds of bottled and tinned American goods, but they are piled on shelves and no particular effort is made to bring them to the attention of those that perhaps would be glad to know of such goods.

In order to introduce effectively American pure food goods, a representative should be appointed who is conversant with not only the native customs and demands, but also the needs of the British population. An effective way to bring goods before the public is by lectures on pure food and demonstrations as to how to prepare the food.

TRADE IN INDIAN CONDIMENTS.

[By Consul Edward J. Norton, Bombay.]

In the Bombay Presidency the pickle, chutney, and Indian condiments industry continues to prosper and the product of local preserving firms is generally more acceptable in India, as well as abroad, than those made elsewhere within the Empire.

The condiments produced by the 18 preserving factories of Bombay are of six descriptions. First, there are the chutneys, of which there are some 20 varieties, such as green, sweet, and mild mango; mixed fruit, hot, medium hot, tamarind, pineapple, and special mixtures.

PREPARATION OF CHUTNEY.

Mango chutney is prepared from green mangoes which, after being sliced, are set in the sun for 24 hours. Then the fruit is drained and boiled in vinegar until tender. In the meantime, nearly equal parts

of vinegar and sugar are boiled with pulped dried apricots, almonds, ground green ginger, garlic, red chillies, and ground mustard seed stirred in. This latter mixture is added to the mangoes, bottled, and the product is ready for the market. All the other chutnies are prepared with the mango as a base with the addition of tamarind, raisins, pineapple, and various hot or sweet spices.

Export prices for bottled chutnies in 50-dozen lots (quarts) range from \$1.95 to \$2.92 per dozen. Chutnies are also supplied for export in casks and hogsheads.

CURRIES AND PICKLES—JELLIES.

The foreign demand for curry stuff in paste and powder has developed considerably within the past few years. Curries are used by most Indian families not only for the agreeable flavor that the spices impart to ordinary food, but largely because they are supposed to be excellent condiments for weak stomachs or imperfect digestion. Curry is usually composed of various condiments and spices which include coriander, tumeric, cummin, pepper, dry ginger, fenugreek, cardamoms, chillies, mace, mustard, cloves, and poppy seed.

The preparation of pickles is another important branch of the local preserving industry. Mango pickles are highly relished by the European and Indian community and are largely exported to England and elsewhere. Lemon, ginger, and onion pickles are prepared in considerable quantities and are considered equal in taste and flavor to English or continental products.

Guava and mango jellies are the chief products in the fruit preserved with sugar, as most of the other Indian fruits are unfit for making jams owing to the watery pulp and their tasteless quality.

MARKET FOR HAMS AND BACONS.

The imports of hams and bacons into India during the fiscal year 1913-14 amounted in value to \$400,347. This was a gain of about 10 per cent over the preceding year and of about 20 per cent over two years ago. Most of the imports are from England and from Australia. But little attempt has been made as yet to introduce American hams and bacons into India.

The consumption of hams and bacons in India is confined almost entirely to the European population. The religion of most Hindu sects forbids the eating of meat of any description, while Mohammedans, although allowed to eat most kinds of meat, are forbidden to eat the flesh of pigs or hogs. The European population, however, makes a very large relative use of hams and bacons in their diet, this being due largely to the fact that good meat is difficult to obtain in India, and even poultry is not of a choice or palatable kind in most instances. There is a very big consumption of hams and bacons amongst British troops in India.

Hams and bacons for export in India should be so cured as to stand the long transport and the hot climate prevailing there. They should be packed in cases and in the usual wrappings and in salt. The ordinary cases imported here contain 2 hundredweight (224 pounds) net meat. The selling prices here are based on the net shipping weight. The quotations are c. i. f. at the following ports: Bombay, Karachi,

Calcutta, Madras, Rangoon, and Colombo. The mode of payment is documents against cash.

There would seem to be no good reason why American producers of hams and bacons should not be able to compete successfully in this market. English hams and bacons are in the best favor here. The Australian hams and bacons are not considered so good. There is practically no production of Indian hams and bacons for local trade. The Indian pigs are poorly bred and badly fed, so that the meat produced from them is of inferior quality.

THE LIQUOR TRADE.

The total value of liquors imported into India during the official year 1913-14 (excluding methylated and perfumed spirit and spirit present in drugs) amounted in value to \$6,086,000, a gain of \$14,000 over the preceding year.

Imports of malt liquors amounted to 4,625,880 imperial gallons, valued at nearly \$2,141,000, of which 3,978,065 gallons came from the United Kingdom. The consumption of German beer increased from 500,000 gallons in 1911-12 to 620,000 gallons in 1912-13, and 622,000 gallons in 1913-14, as compared with 253,000 gallons a decade ago. In addition to what was imported, Indian breweries produced over 5,000,000 gallons.

Imported spirits were also on the increase, the imports of whisky amounting to 709,000 gallons; of brandy, to 401,000 gallons; of gin, to 87,000 gallons; and of rum, to 74,000 gallons. Champagne, an important item in wines, increased in quantity by 2,000 gallons, to 32,000 gallons. The quantity of spirits produced by Indian distilleries was 10,294,210 gallons, compared with 10,779,048 gallons in 1912-13.

INDIAN BREWERIES.

The last industrial census of India showed that in 1910 there were 24 breweries in India, all within British India; of these three did not work in 1910. Seventeen are private property and seven are owned by five joint-stock companies with a nominal capital of about \$8,000,000. Twelve of the breweries are located at stations in the Himalayas from Murree to Darjeeling. The largest brewery is the one at Murree in the Punjab, the next largest being the one at Rawalpindi in the Punjab, Bangalore in Mysore, Kasauli in the Punjab, Mandalay in Burma, and Poona in the Bombay Presidency, in the order shown. Production was largest in 1902, since when it has tended to decline, while imports of foreign beer have increased proportionately.

A substantial quantity of beer brewed in India is consumed by the British troops in India. In 1907 the army commissariat purchased some 38 per cent of the total production, and the average purchases in the five years 1903-1907 amounted to 2,633,616 gallons yearly. From January 1, 1908, the contracts with Indian breweries for the supply of malt liquor to British troops have been discontinued, each British regiment being left free to make its own arrangements to obtain the necessary supply; as a result, the figures of army consumption are no longer readily available.

THE BOTTLE TRADE.

The bottles used in the Indian brewing and distilling industries are mostly those which originally contained imported English or German beer, wines, etc., and have had their labels removed. There are a number of local bottle dealers who purchase empty bottles for sale to Indian breweries and wine factories, which then attach their own labels. A considerable quantity of empty bottles is also purchased by merchants who import spirits of wine, petrol, etc., in bulk for retail sale in bottles. Local brewers and distillers dislike to import bottles direct from other countries on account of the large freight expense and fear of serious loss by breakage. Most of the hops used at local breweries are supplied from the United Kingdom, with occasional small amounts from the Pacific coast of the United States. In 1913-14, 762 hundredweight were imported from the United Kingdom and 200 hundredweight from the Pacific coast of the United States.

NATIVE DISTILLATIONS.

The distillation of native liquors, though important in the aggregate, is mostly carried on by a number of concerns individually of petty importance and under insanitary conditions (usually an immense number of flies about) which would prevent such products from having any large sale except among natives.

Local spirits are usually prepared by distillation of the "mahua" (mowra) flower, molasses, and other forms of unrefined sugar, fermented palm juice, and rice, the last mainly employed in Bengal, Assam, and Burma. Native methods are employed in Bengal, Assam, the United Provinces, the Central Provinces, Sind, the Frontier Province, and Baluchistan. The ingredients are generally fermented in pots and then distilled in rudely constructed stills. The system is crude and the product apt to contain a considerable percentage of fusel oils.

In Madras, Bombay, the Punjab, and Burma manufacture of country spirit or of Indo-European spirit (local brands of rum, whisky, etc.) is, as a rule, carried on in highly organized private distilleries with European appliances. The largest distillery in India is the Alembic Chemical Works at Baroda, which also makes perfumes and medicines. In the manufacture of a cheap native wine from the "mahua" flower this concern, by arrangement with the State government, has a monopoly for Baroda, but also ships its products in large quantities to other parts of India. On visiting this distillery I found up-to-date appliances being used, mostly of French manufacture.

In the State of Kashmir a wine has been produced from grapes which has had some sale among Europeans, but it is said that the industry, not paying, has lately been discontinued.

BEER DRINKING IN INDIA.

The Civil and Military Gazette, published in Lahore, India, in an article on excise administration in the Punjab, states:

Beer is growing in popularity, the quantity consumed in bazaar shops having risen from 47,758 to 130,142 gallons. There appears no reason to suppose that these figures indicate a new outbreak of drinking habits. They only mean the substitution of beer

for spirits, which is on every ground to be welcomed. The spiced country spirit, on the other hand, seems to be ousting the imported article, owing to its attractive color and the labels on the bottles.

MARKET FOR AMERICAN MINERAL WATERS.

A leading merchant in Bombay states that in his opinion American mineral waters might be introduced on the India market. Home-made aerated waters are extensively used, but are not satisfactory in all cases.

SUGGESTIONS FOR INTRODUCTION OF AMERICAN WATERS.

American mineral waters might be offered for sale at prominent hotels, restaurants, and drug stores through agents, who should receive commissions of 10 per cent and traveling expenses. The prices should be lower than the prices of well-known European mineral waters, and the terms of sale should be 90 days after receipt of goods, documents on acceptance. The publicity campaign should be extensive, including, besides a large amount of newspaper advertising, the wide distribution of sample bottles, circulars, brochures, posters, calendars, etc.

It was stated that it would be hardly reasonable to expect any dealer in India to go to the personal risk and expense of trying to push American mineral waters in this country without assistance of a substantial sort, at least at the start, from the American firms most interested in their sale. If, however, American goods of this class once became well known in India, the resulting volume of business would probably compensate American exporters for a large initial outlay.

EUROPEAN MINERAL WATERS—PRICES.

The two European mineral waters best known in India are Apollinaris and Perrier waters. The former sells for about \$2.08 for large bottles (quart) per dozen and the latter for about \$1.84. At retail these two waters are usually sold at the same price—about 20 cents per quart bottle. The latter seems to have a much wider sale throughout India than the former, possibly because the retailer makes a slightly larger profit.

MANUFACTURE OF AERATED WATERS.

One of the most interesting developments in India in recent years has been the rapid increase in the manufacture and consumption of aerated waters. In fact the use of such waters has now become quite general, not only among the European, but also among the native classes of India.

The enormous numbers of Brahmins and Mohammedans whose respective religions strictly prohibit the drinking of alcoholic beverages, are finding in aerated water a substitute that violates no religious principle. Among natives of the strictest caste prejudices, who are ordinarily most careful not to eat or drink anything which has been prepared by persons outside their own caste, no objection seems to be raised to aerated waters, which being made by machinery, are considered untouched by hand of other castes.

The use of aerated waters seems to have grown in popularity, not merely because of being more refreshing than ordinary water, but also on account of the wide belief that it lessens the likelihood of cholera and other dangerous diseases. Such belief is doubtless true as regards aerated water manufactured for European consumption in which case there are reasonable precautions to insure purity. Although in such waters manufactured for the native trade there are little or no safeguards, much more confidence seems to be felt in them than in ordinary water.

Aerated water is now not only the beverage most generally drunk in hotels, clubs, and private residences of the white population, but is also a leading feature of sale in the native bazaars. The water used for the native trade is quite often colored and sweetened, and flavored with lemon, ginger, or kola, but for the European trade it is ordinarily taken plain, except when mixed with spirits, the drink known as whisky and soda being the most common form of stimulant used in India.

USEFULNESS OF AERATED WATERS—LOW PRICES.

The hot climate of India, of course, requires an enormous consumption of water for drinking purposes, and as the usual native water is notoriously full of disease germs, people in this country, until the advent of aerated waters with a reputation of being carefully prepared from pure spring water and filtered, were obliged either to drink ordinary water which they could never be sure had been properly boiled by their servants, and thus run the risk of serious illness, or else go to great expense in buying imported mineral waters. But now the sale of imported mineral waters here is restricted chiefly to strangers in the country who are unable to muster confidence in any water produced in India and wish to be on the safe side.

Local aerated waters are extremely cheap as compared with imported mineral waters. They usually retail for about 4 cents for a quart bottle, whereas an imported water, such as Apollinaris, will retail at 20 cents per quart bottle. The ordinary wholesale price of local aerated waters is about 16 cents per dozen bottles, and at this price there is a considerable profit in its manufacture, as the cost of making it does not amount to more than about 2 cents per bottle and in plants with large output it can be manufactured still more cheaply. When sweetened and otherwise flavored, the aerated water costs somewhat in excess of these prices. When such water is taken away from the place of its purchase a deposit of 8 cents must be made to insure the return of the bottle.

NUMEROUS PRODUCING PLANTS.

It would be difficult to estimate the great number of aerated or soda-water plants now in operation in India. As the majority of these plants do not require more than one or two persons to work them, they naturally do not appear in the factory statistics of India, which take into consideration only factories employing a minimum of 50 persons. In local trade directories there are about 30 aerated water factories in Bombay and about 15 each in Calcutta and Madras, as well as about 100 in minor towns of India, which seem of sufficient

consequence to be listed. It is well known that every British regiment, the majority of officers' messes, also nearly all clubs and hotels at even the smallest towns have their own aerated-water plants. In addition many private families manufacture their own aerated water. It is said that on the tea plantations of Assam practically every bungalow has an aerated-water plant as part of its equipment. There is also an immense number of these plants connected with bazaars selling aerated water to the native trade.

These aerated-water plants vary in cost from about \$67 for a small machine capable of turning out about 20 dozen bottles per day (worked by hand) to about \$2,500 for a large mercantile plant. The average plant, however, in use, especially for regimental and small commercial work, costs about \$250 to \$500. Except certain machines made in India by one company with factories in Bombay and Delhi (The Sirdar Carbonic Gas Co., Ltd.), practically all the machines sold here are imported from England. The manufacture of aerated waters is very simple and inexpensive, and requires little technical knowledge. In India the native labor used in such manufacture costs only about \$3.30 per man per month, and for one of the smaller plants one man can do all the work. Every buyer of these English machines is provided with complete instructions for fixing them and working them, and for making every kind of beverage.

INGREDIENTS USED.

All these aerated-water drinks consist of natural water charged with carbonic-acid gas, under a pressure which varies according to the degree of effervescence required. Different flavors are added by small quantities of sirup or essences injected into the bottle just before being filled with aerated water.

The ingredients used for generating the carbonic-acid gas, from which the aerated water is made, are few and simple. One ton of this carbonic-acid gas can be produced from 2 tons of bicarbonate of soda, 24 hundredweights (hundredweight = 112 pounds) of sulphuric acid, and 3 tons of water. Formerly whiting and marble dust were much used in this connection, but bicarbonate of soda seems now to have entirely taken their place, as an equal quantity of the latter material produces twice the weight in gas of either of the former when mixed with sulphuric acid and water. Bicarbonate of soda is imported into India entirely from the United Kingdom. In 1913-14 the imports were 86,413 hundredweight, valued at \$137,683. The imports of sulphuric acid, mostly from the United Kingdom, amounted in 1913-14 to 63,938 hundredweight, valued at \$178,426. An increasing amount of sulphuric acid is being manufactured at present in India itself.

MECHANICAL EQUIPMENT.

The machinery for making these aerated or soda waters, when sold in India in complete plants, consists of a generator in which the carbonic-acid gas is made, a gasometer in which it is stored until required, and the soda-water machine proper in which the gas and water are intimately mixed at the desired pressure. In addition to the plant a filling machine or machines are required, but as the con-

struction of this apparatus is dependent upon the class of bottle it is intended to fill, they are usually regarded as "extra" to the plant proper. These different appliances are connected by suitable piping. In addition to these, some earthenware or enameled iron jars, capable of withstanding the action of boiling water, are necessary for any manufacture of flavoring sirups, also a few filtering bags for their clarification. For the storage of water, a galvanized-iron tank of sufficient capacity to hold whatever is required, must be included in the equipment, and to these, for the purification of all water that is not required merely for cleansing purposes, filters should be connected. In cleaning the bottles, at the best regulated plants, they are soaked in hot water in a tub, to which is attached a brush capable of being rotated by handles, so that the inside of the bottle gets thoroughly brushed. Over this tub are a number of jets connected with the regular water supply, and on these the bottles are placed in an inverted position after brushing, so that the insides become effectually rinsed.

In the manufacture of aerated waters by native firms for the native trade, little or no attention is paid to cleanliness. Ordinary water is used without being filtered, and the bottles are not properly washed. In examining some of the aerated water sold in native bazaars, especially the sweetened and colored waters, I have observed many dead flies and other insects. The aerated water sold at the best hotels and shops patronized by Europeans, however, is always filtered as well as being taken from sources of supply that are carefully selected and protected from contamination; moreover, the bottles are carefully washed previous to being refilled. There seems to be no complaint as to the impurity or unreliability of such water.

CLIMATIC CONSIDERATIONS.

The most serious drawback to the manufacture of aerated waters in India is the climate, which causes the temperature of all the natural water, except at the higher elevations, to be much warmer than the temperature of most natural drinking water in England or America. As water at such higher temperature absorbs much less gas than water at the lower temperatures of other countries, the cost in India of charging the water with carbonic-acid gas consequently must be higher in proportion to the higher temperature. Ordinary soda water in India must be bottled with about 120 pounds of gas pressure to the square inch, while in England it is stated that only 70 to 80 pounds of pressure to the square inch is required. This peculiar condition in India has caused recent introduction in many instances of water-cooling machines, which reduce the temperature of the water from about 60° to 45°. These machines are capable of cooling from 80 to 450 gallons of water per hour and cost from about \$500 to about \$1,700 each. While rather expensive in initial outlay, they consume little power and effect a considerable saving in gas and breakage of bottles, owing to the greatly reduced pressures at which bottling may be conducted.

The warm climate of India has one seriously adverse effect on the trade in imported mineral waters, for the reason that all air in such bottles on reaching India becomes so heated and expanded that after the bottle is opened a large part of the contents frequently gushes out

and disappears before it can be emptied into a glass. Thus a person who buys imported mineral water often loses as much as one-third of the contents of the bottle.

SUPPLY OF BOTTLES AND CORKS.

All the bottles in use by the India aerated-water industry are of the patented Codd variety, except that one factory in Assam uses bottles with Crown corks chiefly for special identification of its product. The Codd bottles are internally stoppered with glass globes, and the bottles are indented for holding the balls back when filling. This type of bottle has a grooved neck in which is inserted a rubber ring which keeps the ball in place when the bottle is filled. The wholesale rate of sale of these bottles in India is about \$8.30 per gross. Crown bottles may be obtained for about \$5 per gross, and Crown corks for about 24 cents per gross. The price of the rubber rings used in the Codd bottles is about 40 cents per gross, and wooden openers for such bottles cost about \$3.30 per gross. The filling machines for the internal stoppered bottles cost from about \$60 a piece for one with which one person could fill from 60 to 80 dozen bottles per hour, up to about \$320 for one which could fill at a rate of 120 dozen per hour. Hand-power bottle-brushing machines cost about \$6.50 each and bottle brushes about \$3.30 per dozen. All this bottle and bottling machinery used for the soda-water trade in India is of British manufacture. Not long ago an attempt was made at Madras to manufacture soda-water bottles, and machinery for blowing bottles was obtained from Europe, but the capital was exhausted before any commercial success was obtained. It was found that the local demand for soda-water bottles was limited, but when attempts were made to supply Bombay and Calcutta, the company discovered that the freight from Madras to Bombay was more than half the cost at which the bottles could be landed in Bombay from Europe. It seems surprising that there is not a larger use in India of Crown bottles, which would not only be much cheaper, but also could be thoroughly cleaned with less difficulty. The fashion, however, of making use of internally stoppered bottles has become firmly established, and it would doubtless be difficult to induce many aerated-water manufacturers to change their present machinery for bottling or risk the chance of prejudice against the new type of bottle.

ESSENCES, SIRUPS, ETC.

There is a big field in India for the sale of flavoring sirups, essences, essential oils, liquid colorings, etc., in connection with the important aerated-water industry. In the native trade especially, aerated waters sell best when sweetened and otherwise flavored, and also colored, especially in red or orange. The chief essences employed are lemon, ginger, and kola. Also a considerable amount of tartaric acid, citric acid, and saccharin is used. There is also a considerable business in soda-water crates which are sold at wholesale from about \$16 to \$33 per gross. All such materials are supplied mostly from England.

There is a special demand in India for aerated beverages of a tonic or "pick-me-up" character, especially in districts much subject to

malaria. This demand is met chiefly by the use of quinine essences, blended with aromatics. Soda crystals are also much used for dissolving in the plain water in the proportion of about half an ounce to 100 gallons, to enable it to absorb a much larger quantity of carbonic acid gas and make the aerated water more brisk and sparkling. There is also a great deal of ginger beer manufactured here, by simple aeration, to take the place of the old-fashioned brewed ginger beer, which in the climate of India is a troublesome beverage both to make and to keep. The essence used for aerated ginger beer is carbonated in the same way as lemonade and used about in the proportion of 1½ ounces to a gallon of sirup. A fair amount of liquefied carbonate acid gas is also sold in India in steel cylinders for about \$5 each.

The only American preparations I have noticed advertised here at all are American cream sodas and American piping champagnes. American grape juice appears to have been advertised in a small way, but I have not yet found any shop in India where it could be obtained, although it would seem to be a beverage well suited for mixture with the numerous aerated waters sold here, as well as a drink by itself. There are not to my knowledge any American soda-water fountains in use in India. It would be interesting to know what success, if any, would follow an experiment of such sort if tried. Possibly it would run up against the conservative prejudices of people who are now firmly addicted to the custom of drinking chiefly tea or aerated waters at public shops.

BUSINESS POSSIBILITIES.

In order to ascertain if there might not be some business possible for American manufacturing firms in connection with India's very important aerated-water industry, I wrote to the leading firm which supplies machinery, bottles, and soluble essences to this industry, to inquire concerning the feasibility of introducing American goods. This firm replied that although handling soda-water bottles they have never had any inquiries for bottles of American manufacture, nor have they ever heard of any users or importers of the same, although there has been a small trade with Germany. Also as regards soluble essences they have had no experience in imports from the United States. Manufacturers of aerated waters in India are very conservative, and it is most difficult to get any factory of importance to discontinue well-known marks or even to give a trial to what might really be a better essence. At present while this firm is not interested in any line from the United States, yet it mentions that it will always be open to consider any suggestion that might tend to profitable business.

SOAPs, TOILET PREPARATIONS, AND LAUNDRIES.

The demand for soaps in India is showing a very important increase from year to year, and the soap trade of this country is in a flourishing condition. One English firm, which has the largest proportion of the soap trade of India, is said to have increased its sales in this country during the last 10 years at the rate of about 100 per cent per annum, with even a larger rate of increase during the last several years.

The rapid gain in imports of soaps into India is due chiefly to the better class of natives in India being inclined to imitate Europeans in the use of this toilet essential. In fact, even the poorest class of natives will buy imported soaps if they are cheap enough and they can afford to do so. Such caste prejudices as may previously have seriously curtailed the use of imported soaps seem to be practically nonexistent.

PREFERENCES OF THE NATIVE PEOPLE.

The native classes of India, as a rule, much prefer highly scented soaps of rather bright colors, and so long as they are cheap the lathering qualities do not seem to receive much consideration. The soaps of European manufacture for sale in Indian bazaars range from about 1 cent to 6 cents per cake, and for better-class trade go as high as about 65 cents per box of three cakes. A good class of tablet soaps of English manufacture meets with a ready sale at about 4½ cents per 8-ounce tablet among the poorer natives, while tablet soaps of a better class meet with a fair demand at 5 cents per 8-ounce tablet upward. It is said that an English firm with excellent organization and large advertising throughout India, does about 75 per cent of the total import soap trade of the country. It is understood that this firm offers special premiums to native dealers on the sale of its soaps, the premiums being progressive in amount proportionate to the volume of sales.

The competition among native bazaars in the sale of these soaps causes more or less constant cutting of prices, which it is difficult to prevent. In some instances it is said that owing to such excessive competition all the profit the native dealer gets out of the soap may be in the premium he receives on the volume of his sales, and frequently his entire profit is represented in the small value (about 4 cents) of the wooden boxes in which the exporter sends his soaps, the retailer in such cases selling the soap itself at practically cost price.

The American soaps best known in India generally include shaving and medicinal soaps. The best quality of European and American soaps is sold in English department stores and drug stores which cater chiefly for European trade. Aside from American shaving and medicinal soaps, the best-known American general toilet soap appears to be one called "Cashmere Bouquet," which is sold in Bombay for 28 cents per cake. Another leading American

toilet soap, made in Milwaukee, known as "Palm Olive," is being introduced into India, and I learned at one hill station in the Himalayas (Murree) that the leading drug store there had been sending samples of this soap to some of the most influential European "mem-sahibs" (madames) in the vicinity. Another soap, made in New York, known as "Gre-Solvent," for special removal of grease, paint, tar, rust, ink, and fruit stains from the hands, has also lately been introduced into India and appears to be meeting with encouraging success, especially for use in garages and factories. Some motor-car agents stock this soap, with motor-car accessories and are said to find it a paying line. A good many samples have been distributed of late. Sapolio, for cleaning purposes, is known here, and according to a Bombay price list, sells for 10 cents per tablet. An English soap, known as "Monkey Brand," is a soap most used in India for household cleaning and sells for 10 cents per 1-pound bar.

SPECIAL SOAPS—SHAVING SOAPS.

There is an important trade among the European population in carbolic and other medicinal soaps, which are used largely to allay skin irritations and prickly heat, for which the excessively hot climate of India is responsible. Carbolic soaps for better-class use sell for about 6 cents per 12-ounce tablet, while inferior carbolic or disinfectant soaps sell for about 3 cents per 8-ounce tablet. There appears to be a good sale for better-class American carbolic toilet soaps in metal boxes at about 12 cents per box of one tablet each. English antimosquito soaps and sanitary soaps for dogs are much in demand.

The sale of shaving soaps in India is confined chiefly to the European classes and many of the more advanced natives. The prices range from about 8 to 32 cents per cake or metal box or tube. The soldiers of the British Army garrisoned in India are the chief purchasers of medium shaving sticks. The suggestion has been made to me by one dealer in American shaving soaps that smaller sticks of a lower price (say, 4 cents per stick) might be advantageously offered for this trade. The average poor native in India of Hindu caste is usually shaved by public barbers in open streets or by road-sides about once a week for about one-half cent a shave, inferior quality razors being used and seldom any soap or a brush, only water being used, applied with the fingers, for softening the beard. Most Mohammedans have religious scruples against shaving the beard at all, though many shave under the armpits. Among Hindus it is the practice to shave off all the hair of the head as a sign of mourning for the death of a relative.

DOMESTIC MANUFACTURE.

There is a large and growing manufacture of very cheap soaps in India for native trade, highly perfumed, usually round in shape, and selling for about one-half cent to 2 cents for small tablets. The chief constituents of such soap are soda ash, caustic soda, and common sand of the Sind Desert variety. A fair proportion of the native-made soap of India is also made by boiling coconut oil with sand, saltpeter, salt, quicklime, and water. The imports of soda ash and

caustic soda into India for soap making are mostly from the United Kingdom and amount to large sums every year. In 1913-14 the imports of soda ash into India amounted to \$516,686 and of caustic soda to \$284,101. Thacker's Indian Directory gives names of two soap factories in the Punjab, four in the United Provinces, four in Bengal, one in Rajputana, and four in Bombay Presidency.

THE LOW PRICE FACTOR.

The extremely low prices at which native soaps are sold in India, though of inferior quality, and also the low prices at which English soaps of much better quality are sold, should suggest to American soap manufacturers that if they wish to do a large business in India it might be wise to manufacture for the Indian market especially cheap kinds of soaps, inferior, perhaps, to any kind of soap supplied for the home trade, but which, if perfumed and offered at low prices, might meet with very big sales in India.

No soaps, however, containing animal fat should be offered for the Indian native trade, as the religious principles of the great majority of the people would thereby be seriously offended. In advertising soaps for native trade it is well to mention that the perfumes used are floral and the oils vegetable. A good way to advertise soaps here is through illustrations of the flowers from which they are perfumed. American manufacturers might possibly be reluctant to introduce low-grade soaps into this market, for fear they might spoil the reputation of excellent brands they now sell; still, if soaps for very cheap trade were introduced with entirely new names it might not be difficult to prevent any unfortunate confusion with their superior soaps. The poorer class of Indian natives seem willing to buy almost any inferior substance called soap if it is only cheap enough to be within their meager purchasing power. As personal cleanliness and frequent bathing is a matter of religious principle with nearly all the natives of India, it naturally follows that there is wide scope for the introduction of cheap soaps into the country, which, even if of very low grade, would nevertheless be a useful supplement to water, which at present is the only substance a large proportion of the natives use, and the cheapest imported soaps would hardly be inferior to the native soaps now sold for their use at about one-half cent per cake.

The Hindu Brahmin bathes every day and sometimes twice a day, other castes mostly once a day, except the lowest, who would at least bathe about once a week, but even these people will wash their hands and feet before each meal. The Mohammedans usually bathe once a day, but their religious teaching enjoins on them the strict injunction to wash their hands and feet before partaking of each meal. At present all American soaps on the Indian market are far too high priced to be within the means of most of the millions of people in India who would gladly use cheap soaps.

HAIR OILS, POMADES, AND TONICS.

There is quite a large trade in India in hair oils and lotions among European and well-to-do natives, who will often pay as much as \$1 for a bottle of hair lotion. One leading firm in Bombay, which

makes an important specialty of toilet requisites, suggests in an advertisement of various oils, pomades, washes, etc., for the hair, which it deals in, why such articles are so specially used in India. This advertisement mentions:

In any climate, but more particularly in tropical countries, where, in consequence of the sun's direct rays, heavy headgear is worn, a hair dressing is a necessity. Heat and excessive perspiration cause most of the partial baldness and falling off of the hair, as the glands and follicles cease under these conditions to secrete the natural oil necessary for its support and growth, with the result that the hair dies and falls off. The use of an oily dressing will in a great measure obviate this.

The various preparations sold for their tonic, cooling, and refreshing effects on the head include coconut, rose cantharidine, marrow and castor oil, American bay rum, French eau-de-quinine, and lime juice and glycerin. The native shops, as a rule, do the biggest business in such preparations, especially in coconut oil, and many Europeans buy from them. One particular native pomade preparation, selling in bottles for 12 to 33 cents per bottle according to the size, is meeting with increased demand in the native trade, but coconut oil is still most largely used by natives for the hair. Many natives after bathing rub their bodies with mustard oil. The native ladies of India make large use of perfumed coconut oil on their hair. Many native men make considerable use on their hair of a perfumed pasty stick, known as "cosmetic," which is of German manufacture and of black and white colors.

FACE CREAMS—DENTAL PREPARATIONS.

There is also considerable sale in India of face creams and powders. With Indian ladies there is a special predilection for toilet perfumed (floral) powders for the bath. Most of such powders are native made and sell for about 4 cents per packet. One of the most important uses of toilet powders in India is for application after bathing to prevent prickly heat, from which practically all Europeans, at least those obliged to reside in the plains during the summer, are apt to suffer. All the imported borated toilet powders are considered beneficial in relieving prickly heat, but the powder has to be applied in such large quantities to be of much use that the ordinary small-size tins in which the usual American preparations are sold are too quickly used up and are almost too expensive for lavish use. Consequently many Europeans have powder preparations especially put up for them in large packages according to popular formulas for preventing prickly heat. One formula which appears to be much used for this purpose prescribes, in 100 parts, 5 of camphor, 25 of zinc oxide, 50 of starch, and 20 of boric acid, and 1 minim of oil of verbena.

In dental powders and pastes the most important business in India is in American preparations. Europeans and the better-class natives seem prepared to pay good prices for dental preparations. The prices in these lines range from about 8 cents to 33 cents per tube or box. Large numbers of natives use camphor and charcoal powdered and mixed together for cleaning the teeth, which they apply with their fingers. The great majority of natives, however, use no powders or dentifrices of any sort, but rub their teeth with twigs taken from banyan trees, the sap from which they consider gives extra strength

to the gums, taking the place of any manufactured preparation. The poorer class of European school children, especially in charitable institutions and orphanages, who can not afford imported dental preparations, also make considerable use of powdered camphor and charcoal.

DEMAND FOR AMERICAN TOILET REQUISITES IN SOUTH INDIA.

Consul José de Olivares at Madras reports that standard toilet requisites of American manufacture, as perfumes, lotions, talc powders, soaps, sponges, chamois-skin articles, and dressing-table accessories in general, are in good demand in South India and by proper effort the present trade in such commodities could be largely increased. American manufacturers and exporters who have not already succeeded in introducing goods of the foregoing category into the Madras consular district would do well to submit price lists and samples, when possible, to the local department stores and druggists.

FACE PREPARATIONS IN GENERAL USE IN BURMA.

Vice-Consul John H. Monson, of Rangoon, reports that the Burmese ladies use a considerable amount of face cream. It is prepared from the bark of a tree locally grown, ground to a pulp and mixed with a little water to permit rubbing on the face. It is also used on babies, and is supposed to contain medicinal properties, being found useful as an application for prickly heat, rashes, etc. A good per cent of the population of Burma is therefore fond of a face preparation, and there seems to be no reason why such products should not find a ready sale.

CHARGES FOR WASHING CLOTHES.

For washing clothes such European and better-class native families as have washing done at home generally use an English soap (Sunlight) selling for 5 cents per 8-ounce tablet. A vast amount of washing, however, is done outside of the home by a class of natives called dhobies (which means washermen). Their usual charges for washing vary from 1 cent to 2 cents per piece. They depend more on physical effort in beating, pounding, and rubbing the clothes than they do upon soap. It is rare for them to use imported soap in such washing, but a small amount of very cheap soap of native manufacture, in which sand is the important constituent and which is sold in large balls for about 2 cents per piece, is applied to the clothes during the washing operation. Most municipalities in India set apart certain small ponds, lakes, and parts of rivers where the dhobies are permitted to do their washing. Frequently the conditions are quite insanitary, and "dhobie's itch," caused by washing clothes in unclean water, is a prevalent disease of the skin in India. The lowest class of people in India all wash their own clothes.

It is said to be the practice with some dhobies who wash the clothes of Europeans to delay return of the same, and meantime to loan them out for a consideration to those who may wish to pay for their temporary use. The sanitary objections to the present system of washing by dhobies might lead to establishment of steam laundries,

except that, after all, the European population of India is so comparatively small and the dhobie's prices so low that they would hardly pay. As far as I have been able to ascertain, the only steam laundries at present existing in India are connected with some of the large hotels in leading cities.

SOAP TRADE IN INDIA.

The Department of Commercial Intelligence of the India Government has issued a bulletin concerning the local manufacture and also import trade in soap.

It is stated that the position of the soap industry in India at present is disappointing. There is a large manufacture of ordinary washing or dhobie's soap in all parts of India, but the manufacture of domestic and toilet soaps of a good class has not made as much progress as was hoped in spite of the increased demand for these articles in India. The increased demand is reflected in the statistics of imports into India, which show that imports of soap have risen progressively from \$1,502,493 in the fiscal years 1909-10 to \$2,431,944 in 1913-14, the details being as follows:

Years.	Hundred-weight.	Value.
1909-10.....	255, 111	\$1, 502, 493
1910-11.....	275, 244	1, 681, 002
1911-12.....	324, 651	2, 033, 487
1912-13.....	350, 617	2, 314, 030
1913-14.....	362, 860	2, 431, 944

DOMESTIC MANUFACTURE AND DIFFICULTIES INVOLVED.

At the last survey of the industrial position in Bengal, in 1908, it was stated that the manufacture of soap had recently advanced and was attractive to Indian capitalists. The North-West Soap Co., of Meerut, founded in 1879, with a factory also at Calcutta, was the pioneer of this industry in India and is still in a leading position among native factories. This factory, which is equipped with the latest machinery and is under European management, makes all classes of soap, the better qualities being fully equal to high-class soaps imported from England. It also does a large business in the manufacture of candles, and has recently begun to make its own glycerin.

In the Calcutta exhibition of 1906 there were exhibits from four Bengal companies, which produced highly scented, highly colored toilet soaps to meet the large and expanding demand. One of these companies is believed to have ceased working recently, and although a good class of cheap toilet and domestic soap is still produced, inquiries show that difficulty is experienced in producing these soaps at a price that can compete with the cheaper foreign imported soaps. The difficulty is partly that the manufacture of soap requires the use of imported chemicals, principally caustic soda and caustic potash, with which the oils or fats are boiled. The world's supply of caustic potash has hitherto come from Germany, where the potash deposits near Stassfurt are the main source of the raw material.

SOAP MATERIALS AND BY-PRODUCTS.

Caustic soda has been imported from England. The time is doubtless coming when soda compounds will be manufactured in India, and the soap industry, along with other industries, will benefit greatly. Another difficulty is that the perfumes used in toilet soaps have been mainly imported from Europe. A local supply also of cotton oil or coconut oil at a reasonable price is essential for the industry. It is evident that the development of the oil-milling and soap industries must proceed *pari passu*, and the manufacture of soap might be profitably combined with oilseed crushing.

The manufacture of candles is an allied industry, the principal materials required being stearin and wax. The latter can be obtained from Burma, while stearin is an oil-milling product, the local supply of which again depends upon the oil-milling industry. Candles were imported into India in 1913-14 to the value of \$240,398, of which \$185,783 came from the United Kingdom, \$36,430 from Belgium, and \$11,868 from Germany. The economic utilization also of the by-products in soap manufacture is a matter of importance, which Indian companies, because of the small scale on which they work, are apt to neglect. Tallow and the oils used in soap making contain glycerin in the proportion of 10 to 15 per cent, and no company that neglects the recovery of glycerin can hope to compete with European manufacturers.

JAPAN HELD AS AN EXAMPLE—COUNTRIES SUPPLYING INDIA.

The bulletin lays stress on the example of Japan. Not many years ago Japan imported all its soap. Although still importing a certain quantity of the better class of toilet soaps, Japan now supplies most of the local demand and its exports of soap, mainly to China and Chosen, were valued in 1913 at \$748,440. This is in spite of the fact that the raw materials of the industry in Japan are largely imported—vegetable oils were imported mostly from Germany, tallow from Australia and China, caustic soda and perfumes from England, France, and Germany. Japan, it is reported, now manufactures a portion of the caustic soda by the Le Blanc process, but its imports of caustic soda from the United Kingdom in 1913 still amounted to \$650,640.

Of the \$2,431,944 worth of soap imported into India in the year ended March 31, 1914, \$2,220,830 came from the United Kingdom, \$72,545 from Austria-Hungary, and \$55,355 from the United States. The imports of household and laundry soap come mainly from the United Kingdom, the imports from that country being valued at \$1,510,843 out of a total of \$1,528,523. Of toilet soap also the United Kingdom is by far the largest supplier, but Austria-Hungary has sent to India a large quantity of the cheaper qualities. The figures of imports of toilet soap follow:

Countries.	1912-13	1913-14
United Kingdom.....	\$556,776	\$822,196
Austria-Hungary.....	66,766	71,777
United States.....	37,178	52,303
Other countries.....	49,761	61,026
Total.....	709,470	807,301

The soaps imported from England are, as a rule, more expensive than locally made soaps, and continue to have a greater sale because of their superior quality. The prices detailed below indicate roughly how Indian soaps compare with British soaps of a similar class in respect of price.

	Indian.	British.
Carbolic soap, small cakes.	\$0.56 to \$0.80 per gross.....	
Carbolic soap, 5 per cent.	\$1.44 to \$1.60 per gross.....	\$2.40 per gross, f. o. b., less 20 per cent.
Turkish bath soap.....	\$2.88 to \$3.76 per gross.....	\$4.08 to \$4.56 per gross, c. i. f.
Bar soap.....	\$0.80 to \$1.20 per case of 20 bars.....	\$1.32 to \$1.68 per case, c. i. f.

The largest trade is in Gossage's bar soap and Lever Bros.' Sunlight soap, both of English manufacture. Gossage's bar soap is so popular that other English manufacturers whose prices are cheaper have not yet succeeded in creating a demand for their bar soaps. The c. i. f. price of Gossage's bar soap is \$1.68 per box of 45 pounds containing 20 bars, but retailers dispose of a box in small cut pieces at 1 cent per piece.

The Austrian imported soaps were direct competitors with Indian-made soaps. Gotlieb Taussig's Austrian soaps are the best-known brands in the market, the principal qualities being Household toilet soap, No. 812, and Royal soap, No. 795. These two qualities were imitated by Calderara & Bankmann, of Vienna, with brands styled Household saving soap and Lavendar soap, respectively. Practically the only brand of German soap in the market is Gustav Boehm's Household toilet soap. The prices per dozen cakes c. i. f. Calcutta are as detailed below:

Austrian: Gotlieb Taussig's Household toilet soap, 66 cents; Royal soap, 48 cents; Calderara & Bankmann's Household saving soap, 54 cents; Calderara & Bankmann's Lavendar soap, 44 cents. German: Gustav Boehm's Household toilet soap, 52 cents; Lavendar soap, 42 cents.

Taussig's Household toilet soap was sold chiefly to the Chinese, who appear to prefer it to other brands, while Taussig's Royal soap was sold to the richer classes of Bengalis.

ATTRACTIVE CARTONS FOR SOAP.

An English investigator recently made the following comments on the soap trade of India:

There are many articles such as toilet soaps for which there is a steadily growing demand. The desideratum in this case is a soap of purely vegetable origin, put up in attractive cartons, with vernacular descriptions, texts from the Koran relating to ablutions, and similar matter (for Mohammedans) printed on the box or wrapper. For Mohammedans also the boxes should not bear the likeness of any human figure.

BARBER SHOPS AND SUPPLIES.

There are probably not over 30 barber shops in India of sufficiently high class to make use of imported barber supplies. Such shops have practically only the European element to cater to, and many of the Europeans employ native barbers who have no shops but come to

their private residences with razors, scissors, etc., to perform any service required.

The best-equipped barber shops are in Calcutta, where there is the largest European population; a few other cities, such as Bombay, Lucknow, Lahore, and important hill stations, such as Simla (the summer capital of India), Darjeeling, and Mussoorie, also have them in less number. At the hill stations the European population, including civil and military officials and transient tourists, is, in the summer time, relatively larger than in other towns of India.

LADIES' HAIRDRESSING THE MOST PROFITABLE LINE OF WORK.

The proprietor of a leading barber shop in Simla, who also has a shop at Lucknow, tells me that catering to masculine customers is really the smallest and least profitable part of his business, as most well-to-do Europeans shave themselves, chiefly with American safety razors, and go to barber shops only to have their hair cut. The best business is ladies' hairdressing, it being the practice in India for barber shops, or hairdressing shops as they are known here, to cater to both men and women, separate rooms being reserved for each class of customers. The prices charged ladies for hairdressing are about \$0.65 for ordinary morning toilet, \$1 for evening toilet, and \$1.60 for balls and other especially brilliant functions. In case of any unusually important social evening affair, such as a Government House ball, ladies often book time a week ahead for their special hairdressing, and those who do not book sufficiently long in advance may have to come as early as 9 o'clock in the morning to have the desired service rendered.

The most prominent barber shops also do an important business in the making up of wigs, switches, etc., the hair for which is usually purchased in England, France, or Germany. Many of the "purdah" or high-class native women are also said to be large purchasers of wigs, switches, etc., although they do not themselves go into the barber shops, but procure their requirements through their husbands or female attendants. Falling hair and baldness are common among both sexes in India, due, probably, to unfavorable climatic conditions and wearing heavy sun hats which exclude the air.

AMERICAN SOAP—ENGLISH CHAIRS.

American shaving soap is used almost entirely at the best barber shops in India, and there is a large sale of it at department stores, chemists' shops, etc. The same is also true to an important extent as regards American powders, face creams, and razor strops. There is also some trade in India in American hair oils, tonics, bay rum, and perfumes, but there is evidently a much greater trade in such articles with England, Germany, France, and Italy than with the United States. Many hairdressing establishments and chemists' shops make their own toilet preparations, blending or mixing imported spirits, perfumes, etc., and using much local coconut oil. These preparations have a very large sale in India, among both Europeans and natives. The imported perfumes are mainly from Paris, or at least are partly Parisian in their composition.

Although there appear to have been a very few instances where chairs of American make were purchased for barber shops in India, as a rule very simple chairs, with a padded wooden rest for the head are the only kinds used. Usually when chairs are imported, as also razors, scissors, etc., they are obtained in England. One barber tried American scissors, but found them too heavy. Generally speaking, the proprietor of a barber shop in India finds it inconvenient to order articles from the United States, as it takes much too long to get what is required. If he desires to purchase any special American articles, he usually finds it most convenient to buy them in London, particularly small articles that can be obtained by parcel post from England but not from the United States. One Simla barber stated that he ordered in March a particular kind of American face lotion, but it did not arrive until the end of October, when the Simla season had practically finished. In India there is a uniform charge of 5 per cent import duty ad valorem on most manufactured articles, including those which would be required in a barber shop.

HOUSE-TO-HOUSE BARBERS.

The barbers' trade in India is largely in the hands of individuals without shops, some doing a house-to-house business and others plying their trade in the open streets. The barbers have no fixed schedule of prices, but charge whatever they can. In consequence, prices for shaving may be said to range all the way from 1 cent to 16 cents, and hair cutting from 4 cents to 32 cents, according to the caste of the customers served and the disposition of the latter to pay. Barbers purchase their razors and hones from local department stores and their perfumes and soaps from druggists and bazaars. It would be impossible to sell such equipment as modern barber chairs hereabouts, as no barber could afford to purchase such a luxury.

In Rangoon the average income of an ordinary barber-shop owner would not exceed \$160 per month, and that of the very best establishment would average about \$200, while rents for suitable premises range from \$20 to \$35 per month. A shave costs \$0.16, a shampoo \$0.24, hair cut \$0.24, hairdressing \$1, the perfumes, toilet preparations, etc., used being purchased in England, France, and the United States. Massage is not given. The shops owned by Europeans are kept clean and neat. Most of the furniture is made locally, by Chinese carpenters, the equipment of the shops being quite primitive.

British troops in India, of whom there are over 60,000, are shaved and have their hair cut by regimental barbers, always one of their own number who may be specially skillful at this work. No special conveniences, such as imported barbers' chairs, are used in connection with such services.

DRUGS AND CHEMICALS.

[By Consul Edward J. Norton, Bombay.]

India has not developed the manufacture and sale of native proprietary and patent medicines, but the local market has been fairly well exploited by American and British manufacturers, who are meeting public demands by placing their remedies in the bazaars and native quarters, as well as with the European druggists.

Patent and proprietary medicine advertising here is not confined to the daily newspapers published in English; in fact, imported remedies are not advertised to the European or English-speaking population of Bombay to any great extent, and American remedies are advertised hardly at all. The probable reason is that the English-speaking population—those who speak English in their homes—number only about 20,000 persons out of Bombay's total population of 979,445.

Patent and proprietary medicines are being advertised to the people at large by posters, handbills, and space taken in native newspapers in all the principal vernaculars of the city. The advantage of pushing trade in this way is evident.

Native practitioners, particularly the Hindus, usually compound their own medicines and rarely specify any special proprietary product when prescribing. Among the European or foreign physicians a fair percentage of prescriptions call for standard proprietary products. Much has been done in late years toward providing State aid to the native population, and the popularizing of medical institutions and European remedies is largely due to the work of Government and private dispensaries. In 1911, 200,000 people were given medical aid free of charge at the public hospitals and consultation stations.

INDIA'S QUININE SUPPLY.

The following information is given in an article in the Indian Medical Record by Dr. C. A. Bentley, special deputy sanitary commissioner of Bengal:

It is suggested that if the consumption of quinine expands to any great extent in India, which already takes one-sixth of the world's supply, the price will speedily rise. The bulk of the world's supply now comes from Java, but at one time Ceylon produced a considerable amount of cinchona bark. For a number of years quinine has stood at such a low price that bark producers have had only a small margin of profit. Under these circumstances it is hardly likely that they have continued to plant largely, and there is a great risk therefore that a rapid advance in price may take place at any time. Although at present there are some thousands of acres in India planted with cinchona trees, in order to minimize the risk of a great enhancement in the price of quinine in the early future it would be well if the acreage under cinchona were largely extended. Once in the past the policy of the Indian Government led to the whole world benefiting by a supply of cheap quinine, and it is quite possible that if India takes steps to extend the culture of cinchona at the present time it may not only protect its own interests but again perform a world-wide service.

STRYCHNINE AND NUX VOMICA.

[By Consul José de Olivares, Madras.]

Nux vomica is abundantly produced in the Deccan, in Bellary, Cuddapah, Anantapur, and Karnul, in Nellore, and in the northern Circars—Ganjam and Berhampur. Seed to the amount of about 3,568 hundredweight (hundredweight=112 pounds) from the upper districts of the Godavari River are annually marketed. The native States of Cochin and Travancore in southwestern India produce considerable quantities of nox vomica, and the Trichinopoly district on the southeast coast also produces the seed, but to a lesser extent.

The nux vomica, strychnine, or snakewood is a slow-growing deciduous tree attaining a height of 30 to 40 feet and a circumference of 3 to 4 feet, its growth and development depending largely on the extent of the rainfall in the district to which it is indigenous. Generally the trees grow in a wild state, and it is rarely that they are cultivated for commercial purposes.

Nux vomica gatherers are not employed on a wage plan, but sell the seeds they collect to village bazaar men, from whom the product is bought by merchants and sent to the markets at Madras. Exporters as a rule purchase the seeds from the markets, and at times they are obliged to advance funds for their supply.

In Bombay the seed is bought as openly and freely on the market as any other crude drug. The tree is not cultivated nor are the seeds harvested regularly by commercial interests. There are a few exporting firms in this part of India who, when they require seeds for any purpose, instruct their representatives in the various districts where strychnos nux vomica may be collected, and these representatives send out natives to gather the material. The natives collect it by hand and are paid about 65 cents per hundredweight.

CULTIVATION OF SENNA.

The Tinnevelly senna (*Cassia augustifolia*) of Indian commerce which was introduced to both Indian and European pharmacy from Arabia, is extensively produced in the extreme south of the Indian Peninsula, near the towns of Tinnevelly, Madura, and Trichinopoly. It is either exported coastwise to Madras or Bombay and thence to foreign countries, or is consigned direct from Tuticorin, the chief port of the extreme south of India. The drug is also imported by India from Arabia, where it is collected from the wild plant. The Arabian senna, however, is often much adulterated; consequently there is a tendency to import less from Arabia and to grow more in southern India.

VEGETABLE INDIGO.

With the decreased output of synthetic indigo, due to the European war, the dyestuffs trade in various parts of the world has shown renewed interest in vegetable indigo, the sole supply of which comes from India. The demand, however, has apparently not yet stimulated greater plantings there. Of the total area under indigo in India, Madras Presidency has about one-third.

The declining exportation of indigo from all India is shown in the following statistics for certain fiscal years ended March 31, which show shipments to the leading purchasing countries:

Destination.	1909-10	1911-12	1912-13	1913-14	1909-10	1911-12	1912-13	1913-14
	Pounds.	Pounds.	Pounds.	Pounds.	Value.	Value.	Value.	Value.
United Kingdom	320,880	697,648	169,120	375,424	\$163,373	\$403,564	\$74,331	\$207,352
Germany	14,784	40,432	46,368	6,160	8,930	21,668	21,817	4,638
Austria-Hungary	160,160	327,264	233,520	174,048	97,374	207,902	142,306	105,438
France	30,578	58,800	66,416	14,448	19,641	35,564	40,155	9,442
Turkey	546,560	323,344	305,872	317,408	336,484	205,288	180,143	182,138
Persia	264,320	103,264	26,992	54,096	154,458	50,329	15,660	25,493
Egypt	288,064	160,160	188,944	129,584	167,422	86,288	101,948	69,401
United States	115,024	188,944	127,456	67,648	65,683	107,345	63,741	38,358
Total, all countries ..	1,688,736	1,442,672	1,152,368	845,376	972,497	818,056	636,898	481,175

USE OF VERMILION PIGMENT.

The valuable scarlet pigment vermillion is much used in India for religious, ceremonial, and other social customs by the Hindus. A married woman is always marked with it on the forehead. It appears in the emblem of Vishnu on the followers of that deity. It is also used for temple decorations, though not so largely for this purpose as by the Chinese, who use it in great profusion for the adornment of their temples and dwelling houses. It is probably owing to this extensive use of it in China that it is so largely manufactured there, and, notwithstanding the extremely crude method of preparing it, of excellent quality. The Chinaman is somewhat thorough in his methods and will not use adulterated vermillion, contrasting in this with the Hindu, who is often content with a more or less impure pigment.

The apparent apathy of the Indians in securing the profits of an article so largely used by them is probably due to a fear of the difficulties which they suppose to attend its manufacture.

ANTIDOTE FOR SNAKE BITE.

Scientists at Parel Laboratory, Bombay, are making from snake venom an antidote for snake bite. The venom is secured from live cobras and then injected into the blood of a horse. At first a small dose is given, which does not harm the horse, but after short intervals larger doses can be given, until, at the end of two years, the animal can stand a dose 200 times the original one, since it acquires immunity from the poison. The substance which confers this immunity is in the blood, and when the corpuscles are separated from it the residue is the snake bite antidote.

It is worthy of note that each bite requires an antidote made from the venom of the same sort of snake as that which inflicted the bite. It is absolutely effective if injected in time. The rapidity with which a snake bite takes effect largely depends on the amount of the dose of poison. It is seldom that a victim receives the full dose, and it frequently happens that, though the snake may be a deadly one, its bite is not always lethal because it has only injected a small amount of poison. A moderate bite will require two or three little bottles of the antidote, or "antivenine," to be injected within a couple of hours if possible. Several lives have been saved in Bombay by means of the antidote.

At the laboratory there is enough venom to supply all the demands India is likely to make; it is also being sent to Germany and America, cobra venom being very useful in experiments connected with the blood. A similar antidote is being made of the venom of the Russell's viper, but there is no "antivenine" from the venom of the karait, nor from that of the *Echis*. As the karait lives but a very short time in captivity and gives but a small amount of poison, sufficient has not yet been collected at the Parel laboratory to make an antidote. The laboratory is now prosecuting experiments with a view to making an antidote for the bite of the *Echis carinata*, which causes many deaths in the Bombay Presidency.

During the year 1913-14 the mortality caused by snake bites in the Bombay Presidency amounted to 1,406, an increase of 306 deaths over the preceding year. The number of cattle killed by snakes and wild animals amounted to 9,898. In the Central Provinces (also in this consular district) the number of deaths by snake bites during the same period amounted to 1,155, compared with 1,063 during the preceding year. Over 27,000 snakes were killed for rewards in the Bombay Presidency during 1914. Poisonous snakes are found quite frequently, even in the best residential districts of Bombay city, especially during the rainy season. In India, as a whole, the last census showed that for the 25-year period ended in 1911, the number of human beings reported to have been killed by snakes was 543,994.

HIDES, SKINS, AND LEATHER GOODS.

About 5 per cent of the total exports of India is represented in hides and skins, while the internal trade returns of India indicate that the local manufactures in hides and leather were at least as valuable as the foreign trade. During any periods of famine, or when fodder is scarce for the feeding of animals, such trade is abnormally brisk; consequently this particular trade does not furnish a criterion of India's prosperity, but, on the contrary, increasing business may reflect adverse conditions in the country.

The term "hides" is used statistically in India to denote the raw, dressed, or tanned skins of full-grown bullocks, cows, buffaloes, horses, etc., while the term "skins" is applied commercially to those of sheep, goats, deer, and wild animals. During the last two years there have been record prices in India for most classes of dry and salted hides, the advance in prices being caused by a world shortage of hides and an increased demand consequent on the increased uses to which leather is now applied. The average weight of a raw hide in 1913-14 was 10.64 pounds as against 10.07 pounds in 1912-13.

The following table shows the quantity and value of raw hides and skins and of leather exported from India during 1913-14 (cwt. = 112 pounds):

Articles.	Hundred-weight.	Value.	Articles.	Hundred-weight.	Value.
I Hides and skins, raw:			Leather:		
Cowhides	743,000	\$19,153,505	Cowhides	158,000	\$4,780,673
Buffalo hides	346,000	7,147,009	Buffalo hides	16,000	365,523
Goatskins	453,000	10,144,173	Goatskins	74,000	5,223,712
Calfskins	26,000	593,854	Sheepskins	50,000	3,108,735
All other	64,000	982,730	All other .....	.....	306,170
Total.....	1,632,000	38,021,272	Total.....	298,000	13,784,815

The greater portion of the raw cowhides exported from Calcutta are bought for American tanners. It was remarked by the Indian Trade Journal as strange that English tanners have, comparatively speaking, neglected this class of hide, which appears to be even better adapted for the chrome tannage than for the vegetable tannage. There has been an active demand in India for the tanned kips and calf which have been largely used by English tanners for the combination chrome process. It was computed that Germany alone received about 1,000,000 fewer Calcutta kips in 1913-14 than the number imported a few years ago, the reason being the deficient supply rather than lack of demand. All the facts have naturally tended to strengthen the hands of the sellers, and apparently they have made full use of the report. To lessen the number of buyers and reduce competition, the Calcutta Hide Association, consisting of five German and two

English houses, was formed, and the German importers entered into an agreement with the association whereby the shippers would not supply goods direct to tanners but only to the importers.

Raw materials for leather manufactures in India are chiefly the hides of buffaloes and cows and the skins of sheep and goats. Besides these, small quantities of other skins are used, as camel, sambhur, and nilghai.

The present stoppage of import and export trade between India and Germany and Austria-Hungary has far-reaching consequences as regards the export trade from India in hides and skins. During the official year 1913-14, India exported to Germany 388,409 hundredweight of raw hides, valued at \$993,414, and 12,794 hundredweight of raw skins, valued at \$37,598. During the same year 237,829 hundredweight, valued at \$5,974,845, were exported to Austria-Hungary. The hide and skin trade of India has been largely in the control of German merchants, many of whom have lately been confined as prisoners of war.

EXPORTS TO UNITED STATES.

The value of the exports of hides and skins from India to the United States in the last three years is shown in the following table:

Hides and skins.	1911-12	1912-13	1913-14
Raw.....	\$9,677,782	\$13,388,047	\$11,510,590
Dressed or tanned.....	918,512	998,622	1,009,649
Total.....	10,596,294	14,386,669	12,520,239

The principal exports from Madras to the United States are tanned goat and sheep skins, the declared value of which in 1913 rose to \$1,031,300, representing an increase of \$176,536 over the export of the preceding year. A steady and substantial gain in this line offsets the decreases in the exportation from Madras of dry-salted goat and sheep skins, which resulted from the prevalence of cholera in Madras that precluded the shipment of wet skins. In 1913 there was a decrease in the exportation of hide fleshings, due to the fact that a number of shipments from Madras to the United States proved defective. Owing to the efforts of the consulate the claims of American producers were satisfactorily adjusted and the export trade showed an increase in the first quarter of 1914. The exports of tanned cow hides and calf skins to the United States is much smaller in amount.

The declared value of the exports of hides from Calcutta to the United States during 1912 was \$3,394,100, and in 1913, \$3,871,790. In 1912 the declared value of the exports of skins was \$3,754,441 and in 1913, \$5,132,375.

The declared exports of sheep and goat skins from Bombay to the United States amounted to \$2,026,104 in 1913 as against \$1,566,767 in 1912. The declared exports of cow hides from Rangoon, Burma, to the United States were as follows: Dry, \$200,060 in 1912 and \$170,690 in 1913; green or pickled, \$45,100 in 1912 and \$162,610 in 1913.

TRADE IN HIDES AND SKINS AT KARACHI.

Hides and skins form the largest item of all articles exported from the Karachi district to the United States. The combined value of these two articles of export is vastly greater than the value of all other exports to the United States combined. In 1912 the hides, skins, and hide fleshings shipped to the United States were valued at \$2,448,175. No hide rejections were shipped to the United States in 1912. In 1913 the value of hides, skins, hide fleshings, and hide rejections exported to the United States was \$2,202,468. All other exports to the United States combined amounted in 1913 to only \$311,069. By far the largest item in these exports to the United States in 1913 was that of goat skins, valued at \$1,161,263; next in value were sheep skins, amounting to \$838,179.

The American ports to which hides and skins are shipped from Karachi are almost always New York, Philadelphia, or Boston. They are shipped under through bills of lading. The rate varies from 22s. 6d. (\$5.47) to 30s. (\$7.30) per ton of 40 cubic feet. The rate depends upon the demand for tonnage. The merchandise is usually transshipped at Liverpool, the steamship company which accepts the goods in Karachi taking the responsibility for securing proper forwarding vessels.

MINOR HIDES AND SKINS IN THE PUNJAB.

Several kinds of hides and skins other than those of cattle, sheep and goats, which are exported through Karachi, are produced in the Province of Punjab, in northwestern India. They are camel hides, pony and horse hides, donkey hides, deerskins, pig skins, and the skin of the goh, a variety of large lizard of the iguana family. Camel hides from the Punjab are shipped largely through Karachi and go almost entirely to Marseille. Camel hides make good, strong leather, but there is no commercial effort made to tan them in the Punjab. They are simply dried or dry salted. England buys camel hides, but gets them chiefly from the Near East.

Camels in the Punjab are clipped once a year and yield 3 to 5 pounds of hair. In Europe the better qualities are made into the soft, fine cloth known as genuine camel's-hair cloth. The long hairs from camel clippings are used for rugs, artists' paintbrushes, and carpets. Pony and horse hides are exported to Europe through Karachi and a few to the United States. Most of the export went, before the European war, to Hamburg, Marseille, and Hull. Some pony and horse hides are tanned, and used in Delhi in the manufacture of shagreen, used largely in bookbinding. Manes and tails are exported chiefly to Europe, where they are used for making haircloth and other articles. Deer skins are prepared and exported from the Hoshiarpur district in the Punjab. The tanning is soft and the skins are used in making any kind of goods made of doe skin in the United States.

BONES, HORNS, AND BRISTLES.

The exports of bone manures from India in 1913-14 amounted to 105,413 tons, valued at \$2,540,660. Of this large amount the United States was one of the principal buyers, its share being \$207,840. Bombay and Madras are the chief centers where the bone-crushing mills and bone-manure factories have been established. In response to an inquiry from the United States as to whether bones could be

exported from India without being crushed, a Bombay firm said that it would be impossible, owing to the high prices for bones prevailing in all centers of India and the high freight rates by steamer, there being no sailing ship from any port in India to the United States excepting occasionally an oil steamer proceeding in ballast to San Francisco. Bone meal or bone dust can be exported to America at rates considerably lower.

Horns and antlers in their crude state are also largely exported, the traffic being mainly in the hands of dealers in hides and skins. The total export of horns, tips, and pieces of horn and horn meal amounted in 1913-14 in value to \$515,751. About 50 per cent of this trade goes through Bombay, the United Kingdom being the largest purchaser. In the European trade Indian horns are usually distinguished as "deer" and "buffalo" horns.

Comparatively small use is made of other products of slaughtered animals in India, aside from skins, bones, and horns. The hoofs of cattle are generally wasted.

Pig bristles, which are used chiefly in the manufacture of brushes, are an important export product of India. During the official year 1913-14 the value of such exports was \$452,189, the chief countries being the United Kingdom, Germany, and Belgium.

TANNING MATERIALS.

The chief tanning materials used in India are: Babul (*Acacia Arabica*), a tree of which the bark is used; tarwar (*Cassia auriculata*), a shrub of which the bark is used; myrobalans (a fruit of the *Terminalia chebula*, a tree); guttahar (fruit of *Zizyphus xylopyrus*); sein (*Terminalia tomentosa*), which is the bark of a tree. Amlı leaves, behara fruit, pomegranate rind and flowers, mangrove bark, and lime are also used. Of these tanning materials, babul, myrobalans, and tarwar are the most important. Babul bark resembles oak bark in many ways, and is, considering all things, the most useful of all the local tanning materials. It may be used for all classes of leather, except that tanned for export, to which it gives too red a color. Myrobalans are exported in large quantities to other countries. Locally myrobalans are used to a large extent as a kind of fixing agent to all export tannages. Their use as a final bath keeps leather tanned with it from becoming red on exposure to light. Unfortunately they do not, when used alone, give a leather suitable for any trade purpose, and consequently they are always used with other materials. Tarwar is one of the lightest colored tannins known, but unfortunately leather tanned with it turns very dark when exposed to light, and this darkening in color appears to be accompanied by deterioration in strength. Leather tanned with this material is said to be absolutely unsuitable for bookbinding.

Hides and skins tanned for export are almost all dispatched directly to the London auction sales, except sheep and goat skins, which are invoiced direct to the United States.

CAWNPORE, THE TRADE CENTER.

The city of Cawnpore, in the United Provinces, is the center of the hide and leather trades of India. The large number of low-caste natives in Cawnpore and vicinity, who have no religious scruples in connection with these trades, as do most of the Hindus of India,

make Cawnpore an especially advantageous center for industries connected with hides and leather, and it is there the largest tanneries and factories connected with such industries are located.

LEATHER MANUFACTURES.

Besides footwear, the chief articles manufactured of leather in India are moks or kos, that is, water buckets used in drawing water from wells for irrigation; ginning rollers, for which cow and buffalo hides are used; leather water bags, to be carried by bullocks or buffaloes; account-book covers, for which sheepskins are chiefly used; and saddlery and harness. For the better grades of the articles last named considerable European leather is imported. There are also a large number of agricultural requisites made of leather, consisting of such things as whips, bell belts for cattle, straps for yoking oxen, and ropes for strapping up the carts.

A leading harness manufacturer in Calcutta recently said, regarding the possibility of American leather being used in connection with the manufacture of harness and saddlery, that it would take too long to have orders filled from the United States, and therefore it would not be easy to regulate supplies according to the demand for manufactured goods. It was stated that Cawnpore leather is now seriously competing with English leather in the manufacture of harness and saddlery. Although Cawnpore leather lacks the strength and wearing power of English leather, it seems to be better value for the money and affords more profits for dealers to handle it. American leather might compete if prices were low as compared with English leather and if orders could be filled without undue delay.

CHROME LEATHER MANUFACTURE IN SOUTH INDIA.

The manufacture of chrome leather, in which various compounds of chromium instead of vegetable tanning materials are used, is making rapid progress in various parts of India, especially in the Madras Presidency and in the native State of Mysore, where the respective Governments by painstaking official efforts and the introduction of machinery from the United States for experimental purposes pioneered the industry into a position which has subsequently prompted the increasing investment of private capital.

In 1903 the Government of the Madras Presidency, in order to improve the conditions in the tanning industry, began experiments in chrome tanning on American lines, and these were so successful as to lead to the establishment of a Government chrome tannery, to serve mainly as an object lesson to encourage investment of private capital. After the establishment in 1910 of two large private chrome tanneries in the south of India, the Government factory was sold, it being then considered an accepted fact that the possibility of manufacturing chrome-tanned leather in India on a commercial scale had been sufficiently demonstrated.

VARIOUS USES OF THE LEATHER.

The original idea of the Director of Industries of the Madras Presidency in carrying on this work at first at the Madras School of Arts was to manufacture water bags, or "mhotes," as they are called in parts of India. In India the largest demand for leather is for water bags, of which many hundred thousands are required every year, and

for each "mhote" two good hides are used up. To supply the sandals required by nearly 300,000,000 people a very large quantity of leather is also used, and for both these classes of goods chrome leather has been found by the natives to be eminently suited to their requirements. It was soon found that there was no difficulty in doing this and that in fact it was possible to carry the original idea much further, as the leather proved equally suitable for practically all purposes for which it is usually employed. Dyeing and leather dressing were therefore taken up and finished leathers are now made suitable for harness, saddlery, boots and shoes, sandals and slippers, belting, washers for cottoning rollers, and a great variety of other industrial purposes.

Chrome-tanned leather is in every way a superior material to any hitherto produced in India and in many respects it has great advantages over the best imported leather. Water has little effect upon it and chrome leather which has been wetted is as soft when dried as before, and as a material for boots and gaiters this advantage is important. It is well known that ordinary leather is rapidly destroyed when subject to different alternations of wetting and drying, which are so common in India. The ordinary leather in India becomes hard and cracks, whereas chrome leather, remaining soft and pliable, is unaffected by such treatment. Compared with bark leather, chrome leather is soft and well adapted for boots and shoes, while by a special process sole leather can be prepared from it which is extremely durable.

BOOTS AND SHOES.

Among all classes in India there is now a tendency to wear shoes of European style, either of local make or imported. Among those who do wear shoes, probably one-third wear European styles, one-third wear sandals, and one-third wear shoes of native pattern, of which about one-half are of the heelless type. Some styles of native shoes have the uppers made of red morocco leather, but cowhide is now often used owing to a great increase in the value of goatskins. When they are made with goatskin uppers, the back portion, which is turned down, is usually made of either sheepskin or cowhide dyed to resemble the red of the goatskin. In some cases these shoes are padded and have a soft sheepskin sock. They are often embroidered with red thread around the edge of the uppers.

The trade in boots and shoes in India is showing every year a tendency to increase. Cheap grades of low shoes are especially popular with the natives and are to be noticed in all the Indian bazaars. Probably half of the boots and shoes in the native trade are made in India, chiefly at Cawnpore, the great seat of the leather industries of India, the remainder having been imported chiefly from England and Germany. The value of the imports of boots and shoes in 1913-14 amounted to approximately \$2,702,000. Boots and shoes manufactured in India retail at from about \$2.25 to \$2.60 per pair. The import business is usually transacted either direct or through local indent firms at sight through banks.

A letter addressed last year to one of the leading boot and shoe dealers in Bombay said:

It is difficult for me to understand why so few American boots and shoes are sold in India although the American export trade to other countries is very large. I have

often heard persons here express regret that it is so difficult to buy American shoes, as hardly any shops carry them in stock. What are the reasons, in your opinion, for this poor trade in American boots and shoes? Is the difficulty in the prices, the patterns, or the mode of attempting to do business here?

The letters received in reply indicated that American boots and shoes are too high in price for the Indian trade, the patterns are not entirely suitable, and the methods of attempting to do business, chiefly by correspondence, sending of catalogues, etc., are ineffective. One leading department store in Bombay writes that it acts as agent for one popular brand of American boots and shoes and does quite a business in this line, but that there is a demand for cheaper footwear, which it thinks could not be purchased in America at prices low enough to compete with English-made articles. Among other expressions of opinion, the following are of interest:

We would never dream of ordering boots from catalogues; in fact all our buying in this department is done through our London office, which is a big organization especially fitted to secure for us the best possible values in all lines. Our buyers also go across to America from time to time.

There are several reasons why American boots and shoes do not sell in India. (1) Up to a short while ago the shapes shown by representatives did not appeal to the public, whose tastes were better satisfied by English models; (2) the foot of an Indian is not the same as that of a European, being long and narrow, while American boots are usually very wide; (3) American boots look, and often are, too heavy for wear in a tropical climate; (4) the prices of American boots and shoes are too high for the ordinary medium-class trade in India, both for Europeans and Indians; (5) there is too much haste with the representatives. India is a slow-going and conservative country, and it takes a long time to gain the confidence of the public. Sketches in catalogues of American boots and shoes are often deceptive and do not sell boots nearly as well as actual samples.

The reasons why American boots and shoes are not selling in big quantities in India are as follows: (1) There are no active and experienced agents representing American firms; (2) the agents who represent American makers do not sell the goods at the factory prices; (3) many times American goods differ from the samples in quality, finish, etc.; (4) prices are higher in comparison with English manufacture, and they do not make alterations in the samples as per indentors' requirements, as English makers do. We think that now is the time for good and reliable American makers to introduce their goods into the Indian markets.

The American boot has style and appearance, but for working quality and value it can not be compared to an English-made one. The English manufacturers have taken the Indian trade seriously in hand and sent out travelers, which for us is by far a better method than buying from catalogues.

The Indian market wants goods of cheap quality and prices, as the competition is keen. American goods are dearer in comparison with English makes which control the trade.

LEATHER PURSES.

The Director of Commercial Intelligence of the India Government states that leather purses are imported in India in larger quantities from Austria than from Germany. There is a large demand for the Austrian purse among the poorer classes of people owing to its low price. It is imported in one quality only, of which there are four sizes, known as Nos. 5, 7, 8, and 9. The following are the prices per gross c. i. f. c. i.: No. 5, \$2.16; No. 7, \$4.44; No. 8, \$5.16; No. 9, \$6.36.

The price of German purses varies from 72 cents to \$7.68 per dozen, according to quality. They are imported in small quantities and consist mainly of purses of superior quality. Leather purses are made in India in several sizes and are sold in Calcutta at \$1 to \$5 per dozen. It is believed that there is an increasing sale for the Indian-made purse.

MISCELLANEOUS IMPORTS.

MUSICAL INSTRUMENTS.

Imports of musical instruments into India for the year ended March 31, 1914, amounted to \$743,994, which was an increase of \$45,939 over the previous year. These imports are mostly from the United Kingdom, Germany, and France in the order named and small proportions from the United States, Italy, and Austria.

American pianos find an unfavorable market in India, because they are built too large and high to make them popular with local customers, who belong chiefly to European migratory classes. The main requisite for pianos in India is easy portability. Most of the purchasers are officials connected with the Indian military and civil service and members of the foreign mercantile community, few of whom have intentions of permanently residing in the country. Such persons are frequently obliged to shift their residence in accordance with instructions they may receive almost anytime. Naturally, therefore, they prefer pianos which can be moved about without undue expense or damage and which could also meet with ready sale in case of leaving the country altogether. Such persons consider pianos not as investments, as purchasers often do in other countries, but only as temporary means of amusement. The pianos desired are the cheapest makes possible consistent with good tone, and no pianos are wanted which are more than 4 feet high.

LIMITED MARKET—MUSICAL TASTES OF PEOPLE.

One leading piano dealer estimates that out of a total of about 315,000,000, there are probably not 500,000 people who may be considered as possible purchasers of pianos, as the average means and tastes of the bulk of the native population are not such as to render them likely customers for such instruments. A limited number of native princes and well-to-do native merchants have pianos, but they are usually kept more for show and for imitation of a western feature of luxury than for active use.

The native taste for music runs in the direction of harmoniums of a cheap type—usually not more than \$30—imported from Germany, and of instruments of various shapes and styles, known usually as “zitars,” constructed on the plan of the mandolin, and selling from \$1.50 up to \$70. These latter instruments are made locally and often are fantastic in appearance. Together with a native drum they make up the chief feature of musical accompaniment to the entertainment of nautch girls on occasions of weddings and other festivities and at native theaters.

In the Hindoo temples harmoniums furnish the chief music. Generally speaking, the native music is of a peculiar somber and screechy type with constant repetition of the same notes. Some of the most cultured and well-to-do natives who have acquired a

taste for Western music appreciate American organs. For instance, his highness the Maharaja of Mysore has an American organ in his palace said to have cost about \$25,000.

On pianos for India, sconces are not much used, although English piano exporters to this market provide them so that they may be attached or not, as desired. The climate is so hot and insects are so troublesome that most persons playing pianos do not like to have lamps or candles on sconces right by their heads, owing to the heat and the attraction for insects of such lights. Usually the piano is kept as far from lamps as possible. Most pianos in use here are built of solid mahogany and French polished.

SALES METHODS—PORTABLE PIANO.

Pianos are usually sold in India either for cash or on a basis of 12 monthly payments at a somewhat higher rate, or on 24 monthly payments at a still higher rate. The cost usually varies from about \$100 to \$400, with a much larger sale, however, of those of the lowest prices. One piano especially constructed for convenient portability, and selling for \$100, has a weight of 140 pounds without the case, or packed in strong metal-lined deal case about 224 pounds. The instrument measures 44 inches wide, 26 inches high, and 14 inches deep. It has a compass of five octaves, and the keyboard folds as in yacht pianos, thus economizing space as far as possible. The metal-lined case costs \$5 extra. A special tropical upright grand piano sold here for about \$260 is overstrung to reduce its height, and it is said that the crossing of the strings, with their long length, tends to impart a rich and sustained sonorous tone. A recent issue of the Indian Textile Journal states that:

Musical instruments composed mostly of wood suffer more in India from the climate than any other structure of the same materials. Organs, pianos, violins, and guitars require frequent repairs on account of the shrinking and swelling of their material during the changes from wet to dry weather. The movement of wood in swelling being across the grain and not in the length, swelling and shrinking tend to separate the piece and injure its musical effect. One of the best and most experienced authorities in India, himself a manufacturer of pianos, states that the life of the best sounding board in India is on an average 18 months. At the end of this time it needs rebuilding to restore the original tone. No other material has yet been found to take the place of wood in the sounding board of musical instruments. Although they are built of the most carefully selected and seasoned wood, they have to be put together in a stove where the heat is as high as the workman can bear. This shrinks the wood to the greatest degree, and in this state it is firmly fixed to an iron or steel frame. When in a damp atmosphere it swells irregularly, and this swelling always ends in rupture to a greater or less extent. Rebuilding of the board is then the only remedy.

It is thus apparent that pianos for the Indian market should be cheap, portable, of good tone, and so constructed as to show the least possible deterioration from unfavorable climatic conditions. A great many pianos and organs are used in mission schools in India, but I understand that these are seldom bought in India but sent out from England or the United States by the missionary organizations having headquarters in those countries. No pianos are made in India.

PHONOGRAPHS AND STRINGED INSTRUMENTS.

Talking machines are now quite well introduced into India. They are nearly all of the gramophone disk machine type, and are made mostly in Germany and Austria. The leading musical instrument

dealers of India have given up all attempts actively to promote or advertise such machines, owing to the fact that native bazaars are content to sell them at such slight profits, often for not more than 30 cents profit per each machine, that it is no longer worth their while to make such machines a feature of their business. There is practically no demand for wax cylinder machines, for the same reason that extra high pianos can not be sold here, easy portability being required, and such requirement being best fulfilled by using disk records which can not break or suffer damage from heat and which can easily be packed in small space.

There is little demand in India for imported stringed instruments. Nearly all of the bands of India are military bands, regimental instruments and music for which conform to the general standards of the British Army and the orders for which are usually placed in England.

GLASSWARE.

The value of the glass and glassware imported into India during the year ending March 31, 1914, was \$6,311,135, Austria-Hungary participating in this trade to the extent of \$2,834,935; Germany \$927,445; United Kingdom, \$850,175; Belgium, \$627,890; Japan, \$513,035; China, \$161,800; Italy, \$158,790; and France, \$141,070.

Austria-Hungary easily ranks first on account of its sales of glass bangles, and also takes a prominent place in the trade in beads and false pearls and lamp glass. Among exports from Germany appear bottles and phials, lamp glass, and beads and false pearls; some of these goods, however, are probably of Austrian manufacture, shipped from Hamburg because of the more frequent sailings from that port. The United Kingdom properly monopolized the export of soda-water bottles and also exports to India other bottles and phials, sheet and plate glass, and miscellaneous glassware. Belgium is the largest exporter of sheet and plate glass and tableware. Japan heads the list in beads and false pearls and takes an increasing share in the export of bottles and phials (other than soda-water bottles), tableware, and miscellaneous glassware. The exports from China are practically confined to bangles, while France and Italy specialize in beads and false pearls.

CHIMNEYS, TUMBLERS, AND BEADS.

The most popular brand of lamp chimney on this market is the Austrian "Ditmars." German chimneys are not asked for to any great extent, as it is claimed they become "frosted." Japanese chimneys, although cheap, are not yet established in popular favor.

Ice-proof tumblers of Austrian manufacture are generally preferred, but a heavy demand also exists for half crystal, heavy-bottomed tumblers from Belgium and Japan; the latter are more expensive than the Austrian thin tumblers, but, being less brittle, they last longer.

Japan has won much of the trade in saltcellars, formerly held by Belgium; these two countries divide the trade in the oil glasses used by the poorer natives in place of ordinary lamps.

Glass and imitation coral beads are imported in a variety of styles and sizes. Austria now sends only imitation coral solid beads at prices ranging from 3 to 96 cents per gross, according to size. The smallest size at 3 cents is 5 by 6 millimeters (about 0.2 inch) and the

largest at 96 cents is 16 by 14 millimeters (0.63 by 0.55 inch). The supply from Japan consists of hollow beads only, the price ranging from 6 to 12 cents per box of 1,200 or 2,400 beads, according to size. These beads were formerly supplied by Austria. Italian glass beads, known as pound beads, cost \$5.76 to \$7.20 per hundredweight; Italian glass or seed beads cost 30 to 48 cents per bundle of 25 bunches, each bunch consisting of 120 strings each 7 inches in length. Italian beads are said to have largely displaced the French article.

Even English manufacturers find it impossible to compete with Austria in certain types of fine glass. A striking instance of this has recently come to notice. The Indian medical department used to import annually from Austria a large quantity of fine glass tubes for holding quinine. It has now become necessary to attempt to obtain these from England, but the lowest quotation for similar glass tubes from England is exactly three times as high as the price previously paid to Austria.

GLASS BANGLES.

Glass bangles are an important article of import into India, owing to the universal wearing of these ornaments by native women and children of all classes around their wrists. The term bangle as applied to the trade in India is equivalent to the term bracelet as understood in the United States. Most of these bangles are imported from Austria, and have a variety of colors, and range in diameter from about $1\frac{1}{2}$ to $1\frac{3}{4}$ inches for children's bangles and $1\frac{1}{2}$ to $2\frac{1}{2}$ inches for adult ladies' bangles. The most popular colors are said to be amber and lavender. Red, yellow, blue, and pink colors are also favorites. The sale of these bangles is one of the most interesting and characteristic features of Indian native bazaars.

The number of bangles worn depends a good deal on the prosperity of the persons purchasing them, but even the poorest women and children will wear as many bangles of bright colors as their means will permit and as can be conveniently carried on their wrists. These bangles often look surprisingly small, and as if impossible to push over the hands without breaking. This is usually, however, skillfully done by the dealer who sells them, and once placed on the wrist the bangles stay there until they get broken. For some of the wealthy native ladies bangles inlaid with gold, or even of solid gold, may be used. The extensive use of a number of bright glass bangles adds a great deal to the attractive picturesqueness of the appearance of Indian ladies. The poorest women, even of the coolie labor class, like to wear bangles, even if such vanity has to be paid for by sacrifices in other directions. The leading kinds of bangles with their sizes and prices, are as follows:

Kinds.	Size.	Cents per dozen.	Kinds.	Size.	Cents per dozen.
Amber.....	1 $\frac{1}{2}$ to 1 $\frac{3}{4}$ inches.	6	Satin (pink).....	All round sizes	9
Do.....	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ inches.	8	Yellow mirror (green and gilt),	do.....	26
Lavender.....	1 $\frac{1}{2}$ to 1 $\frac{3}{4}$ inches.	6	Common.....	do.....	3
Keri hero (purple and gold).	All round sizes	50	Teaklie (pale blue).....	do.....	24
Granat, red.....	do.....	24	"Salami" and fancy bangles for show.	do.....	24
Granat, red and gilt.....	do.....	36			
Moon and star (blue and gold).	do.....	48			

The moon and star bangles or star and crescent bangles are in special demand for Mohammedan ladies. Although the majority of the bangles used are round and smooth, yet a great many are polygonal in shape, octagons being especially common. Many of the bangles used are extremely narrow in width, some not over an eighth of an inch thick, and these are naturally fragile, while others, especially the polygonal styles, are much heavier, wider, and stronger.

The bangles of this trade are usually purchased by local wholesale dealers, who dispose of them to the bazaar trade. These dealers as a rule get favorable terms from the manufacturers in Austria, about 60 to 90 days' credit being allowed on consignments, and profits or commissions permitted are 5 to 10 per cent. These wholesale dealers make their own arrangements with the bazaar trade, for cash or for credit, and for various prices as their knowledge of the trade and conditions of competition may warrant.

There is also considerable trade in glass beads for wear around the neck, these being also of European manufacture. Around the ankles Indian women and children wear ornaments of brass and silver, the latter whenever it can be afforded. A great deal of the silver that comes to India is molded into such ornaments by local silversmiths.

It might be possible that American glass manufacturers would, in connection with the manufacture of various glass articles, such as bottles, vases, plates, etc., find it to their advantage to try the production of glass bangles for the Indian market. It would seem that the manufacture of such bangles would be comparatively simple, and if the prices were low enough they could undoubtedly compete with those imported from Austria. The monetary value of the imports of glass bangles into India every year must be very great indeed, although it would be impossible to approximate the value of such imports, as no separate statistics are kept of the imports of this class of glassware.

TOYS AND SPORTING GOODS.

In the Indian customs classification, toys and requisites for games and sports, including fishing tackle, are not stated separately. The imports of this class are fairly large and show a tendency every year to increase; their value during the year ended March 31, 1914, amounted to \$1,435,000, as against \$1,359,000 for the preceding year. In the memorandum issued by the Department of Statistics of the Indian Government relating to the trade of India with Germany and Austria-Hungary, it is shown that over 26 per cent of the trade in imported toys in India is held by Germany. Imports of toys and requisites for games and sports amounted during 1913-14 to \$376,093 from Germany and \$145,956 from Austria-Hungary. The United Kingdom supplied toys and requisites for games to the value of \$626,099, while the United States supplied similar articles to the value of only \$69,713. These figures include playing cards, which are largely used in India, but exclude firearms, although these are frequently used in connection with sports.

TOY IMPORTS BY COUNTRIES—KINDS OF TOYS USED.

The Indian Trade Journal gives the following figures for the imports into India of toys only, from the principal countries of origin, during the last two fiscal years:

Countries.	1912-13	1913-14
Austria-Hungary	\$70,540	\$99,914
Germany	330,484	343,040
Japan	110,600	163,013*
United Kingdom	224,667	199,629
Other countries	58,388	60,573
Total	784,679	866,169

Toys in India are sold among the natives, chiefly at the religious fairs that are a feature of the life of the country. There are no special shops for the sale of toys. Every village, or at least one village among a group of villages, has its annual fair. In towns, fairs are more frequently held, and in cities they are held in large numbers. At fairs the two great Indian communities, the Hindus and Mohammedans, freely mingle with each other.

The majority of toys are made of clay; others are made of wood, iron, brass or other minerals, stones, cloth, etc. They generally represent animals, conveyances, etc. Dolls of both European and of Indian manufacture are sold. Those of European manufacture are of the simplest and cheapest sort. The native dolls are made chiefly of painted clay, lacquered wood, or cloth of bright colors, ornamented with tinsel and beads. Miniature native costumes are used and likewise rings through the noses and around the ankles.

INTRODUCTION OF FOREIGN TOYS.

Toys of foreign make first began to come to India as works of art and mechanical skill and were bought by rich people as ornaments. Before toys began to come to India from western countries they were imported from China; but Chinese toys were gradually replaced by the machine-made toys from the West, first imported from the United Kingdom. Toys of foreign make first became available in seaport cities, where they were bought by Europeans and by the higher and middle classes of the native population. They were carried into country districts by European officers and rich Indians and are now sold at fairs even in the remotest parts of India. The increasing sale of Japanese toys is an interesting feature of the trade.

A bulletin on the toy trade of India, issued by the Department of Commercial Intelligence, states that the imports from Germany and Japan are mostly the cheaper varieties. In many cases German toys are cheaper than the corresponding English toys and have established themselves in the market for that reason; in certain cases, such as rag dolls, English and German prices are practically the same, and dealers then prefer to obtain their supplies from the United Kingdom. As an illustration of the enterprise and care shown by German firms, it may be mentioned that in the manufac-

ture of porcelain and china figures of Indian deities, which have a large sale, the German manufacturer takes the trouble to find out and reproduce in each case the religious colors in vogue in India.

WHOLESALE PRICES AND DESCRIPTION OF TOYS—IMPORTS FROM JAPAN.

The toys usually received from sources not now available, with some wholesale prices c. i. f. Calcutta, include the following:

Rag dolls, 2 to 24 cents each.	Eggshell porcelain figures, 20 to 84 cents each.
Nanken dolls, 1 to 36 cents each.	Aluminum toys (tea, coffee, and dinner sets), 8 cents to \$1.44 per set.
Toy pianos, 12 to 60 cents each.	Picture puzzles.
Metallophones, 4 to 24 cents each.	Games.
Mouth harmonicas, 8 to 24 cents each.	A B C blocks.
Trumpets, 60 to 96 cents per dozen.	Tram and motor cars.
Religious figures, not glazed, 8 to 24 cents each.	Plush dolls.
Biscuit china figures, 4 cents to \$2.40 each.	Teddy bears and other animals.

Twenty per cent discount is allowed on all the foregoing articles.

The heads, legs, and arms of nanken dolls are of china clay, and the bodies of rags and straw. Since musical instruments, such as hand harmoniums, are already made in India in large quantities, it is probable that the toy instruments mentioned in the list could also be made locally. Toy drums and tambourines are imported almost entirely from the United Kingdom. Similar articles are made in India, but they are of inferior quality. Glazed china figures are made at the Calcutta Pottery Works, but not the nonglazed. The local works have not, it is understood, attempted to make biscuit china and eggshell porcelain figures. Most of the picture puzzles, games, and A B C blocks are made of wood or cardboard, covered with paper pictorial prints in various colors and designs.

There is a large and increasing import of china toys from Japan at 8 to 24 cents per dozen. Similar toys are made in India, but are more expensive. It is understood that new machinery has been imported from Germany by the Calcutta Pottery Works to compete with this Japanese line.

INDIAN TOY INDUSTRY.

In many parts of India the production of toys is carried on to an important extent, usually as a kind of cottage industry, as in Germany and Japan. Indian toys vary between rude village productions and fine marble toys made at Agra, such as small imitations of the Taj Mahal and fine ivory toys made at Delhi. The cuttings left by tailors are largely utilized in making cloth dolls. At religious fairs images of gods predominate. Some of the toys are crude, but others exhibit remarkable workmanship. Some centers are famous for toys of particular make; Jeypore produces toys of stone; Benares, of brass. Some of the toys made in places like these are purchased by foreigners and taken out of the country, but a regular export trade in Indian toys apparently does not exist.

The Indian toy industry evidently suffers for lack of organization and care in turning out finished goods, so that in spite of its being almost universal in India it tends to languish in competition with

foreign goods. The increasing tourist traffic in India of late years has helped to rescue the native toy industry from a serious decline, as tourists will pay much higher prices for Indian toys than natives will. At Delhi, Agra, Benares, and Simla there is a considerable trade in native toys for European purchasers, most of these being native dolls, lacquered woodwork, and some interesting tops and balancing devices, in the manufacture of which Indians seem to be especially clever.

The taste of Indian children for toys is not different from that of other children, but as a rule they have to be content with much cheaper toys, owing to the general poverty. The European toys commonly sold to natives would be unsalable in American cities; high-priced toys are sold only to European children or those of a few rich native families.

POPULARITY OF OUTDOOR SPORTS—FISHING TACKLE—BRIDGE AND BILLIARDS.

The increasing attendance at schools and colleges and the growing interest in field sports among the more advanced classes of the natives have stimulated the demand for the articles with which to play such games. Cricket, hockey, and football are now popular, while polo, played with remarkable expertness, is the special pastime of the Indian nobility. Requisites for such games are largely imported, but are also made in India chiefly in the Punjab cities of Lahore, Rawalpindi, Amritsar, and Sialkot. In Sialkot there is much specialized manufacture of such articles; one factory there employing 100 men and boys under a European foreman is said to send a regular supply of tennis and Badminton rackets and cricket balls to a well-known English dealer in sporting goods.

Frequent trips are made into the jungles for shooting, and to secluded lakes and rivers, especially near hill stations, for fishing. Most of the fishing tackle is imported from England. The most common fishing is for the mahseer, which abounds in the head-waters of Indian streams. The mahseer weighs as much as 25 to 40 pounds, so that strong rods, reels, and lines, and usually special treble hooks or extra strong single hooks are needed for such fishing. There is an unusually large sale of such fishing tackle at most of the Indian hill stations.

Bridge is the most popular indoor game of India, among both European and well-to-do native residents. Most of the playing cards come from England, but there is an important sale for American playing cards. Billiard playing is also greatly in vogue in India, and the leading clubs and hotels are all equipped with billiard tables, the large English sizes being used. The billiard balls are mostly of composite material, better suited to the climate than ivory balls.

FOLDING BOATS.

A leading hardware dealer in the Province of Mysore advises me that there would be a good opening in India for American folding, collapsible, waterproof boats, if such boats could be really waterproof and not subject to serious deterioration from intense heat and sunlight.

Some American collapsible folding boats were recently introduced to this market, and in theory they were very acceptable, but unfortunately when put to the test of actual use on rivers and lakes, where the temperature even in the shade was around 112° F., the waterproof composition with which these boats were coated showed a tendency to melt and become extremely sticky, thus damaging the boots and clothing of those in the boats, as well as rendering them unsafe for any extensive use on the water. These boats were built of easily folding canvas and weighed only 50 pounds, and until their impracticability under hot-weather conditions was demonstrated they readily sold for about \$60 each. They came neatly packed in boxes, with a supply of waterproof composition inclosed to last for a year.

Collapsible waterproof boats would be a great convenience, if of a reliable type, to the many persons in India who make trips into the jungles for hunting and fishing, and would be especially popular among army officers when making such trips on leave. When starting on such fishing or hunting trips, frequently in remote jungle districts, collapsible boats weighing not over 50 pounds can be easily shipped with other luggage to the final train destination and then carried by single coolies through the jungles until rivers or lakes are reached, where they can be unpacked and unfolded and put into the water for use as required. On most expeditions into the jungles, especially during the rainy season, boats of some sort are essential, and of course the difficulty and expense of such trips can be greatly minimized through the use of collapsible boats.

EXPLOSIVES.

Practically all the commercial explosives used in India come from Glasgow, Scotland. The use of explosives for preparing the soil for agricultural purposes is little practiced as yet, but a fair amount is used in connection with mining and railway and irrigation construction works.

The Department of Commercial Intelligence of the India Government has furnished the following statistics as to the quantity of explosives imported by sea into British India for the year 1913-14 (cwt. = 112 pounds):

Explosives.	Quantity.	Value.
Blasting fuse.....	3,155	\$60,025
Blasting gelatin.....	6,060	202,350
Dynamite.....	3,624	105,763
Gelatin dynamite.....	1,581	46,510
Others.....	3,772	110,380

MATCHES.

Matches are one of the most indispensable articles of import into India, as nearly all of the millions of people within this Empire, whether rich or extremely poor—the latter being the condition of the vast majority—are obliged to make more or less constant use of matches. Not only are matches required for ordinary domestic and industrial purposes, but for lighting cigarettes, pipes, etc., most people of both sexes being smokers. As the ordinary materials

smoked are exceedingly inferior and cheap, the cost of matches with most native smokers is an item of considerable expense. The country native uses more matches than formerly, as he has come to understand their use and to have more money for buying purposes than he had 10 to 20 years ago. There are few match factories in India. Indian woods have so far been found inferior to those used abroad for making match sticks.

White phosphorus matches are not allowed to be made in India or imported into the country. The law known as the Indian White Phosphorus Matches Prohibition Act went into effect regarding importation July 1, 1913, and regarding sale, July 1, 1914.

Until recently matches "made in Norway" or "made in Sweden" monopolized the Indian market. The Japanese, however, have entered this field of industry, and at present the Japanese article is a formidable competitor in India of the Swedish match. The Japanese article is undoubtedly inferior to the Scandinavian, but it is cheaper, and cheapness, even when accompanied by inferiority, is a great recommendation in the Indian market.

Formerly Japan exported large quantities of white sulphur matches, but it made a remarkably quick change when the Indian law went into effect and now sends safety matches that come within the law. Sweden and Belgium were slower and lost headway in their exports to India.

IMPORTS AND PRICES—DAMP WEATHER AND ITS EFFECT.

The total imports of matches into India in the year ended March 31, 1914, was 13,894,318 gross of boxes, valued at \$2,908,469. The largest imports were recorded in 1912–13, when 15,000,000 gross of boxes were imported.

The principal countries supplying India with matches, according to quantities (in grosses) are as follows, for the year ended March 31, 1914: Sweden, 3,635,334; Norway, 865,081; Germany, 188,817; Belgium, 307,562; Austria-Hungary, 1,376,762; Straits Settlements (including Labuan), 85,704; Japan, 7,287,485.

It is stated that a difficulty in obtaining certain chemicals and also the thin, tough paper used in making match boxes may cause a rise in prices of Japanese and other matches. The bazaar price of matches is governed in India more or less directly by the importers' prices, which rose 9 per cent in the case of Swedish and 8 per cent in the case of Japanese matches in the first two months of the war. Matches sell for 8 cents per package of a dozen boxes.

It is difficult to find a match that will stand the damp weather here before and during the monsoons—about four months. Safety matches become saturated and sometimes a dozen fizzle or the heads crumble off. If an American match could be found the head of which would light and remain on the stick in damp weather, it would sweep the market, even if it cost more than the matches now in use.

COMBS.

Combs made of horn are not imported from Germany or Austria, excepting a small quantity of tooth combs. Italian tooth combs made of horn are largely imported, being cheaper than the German or Austrian makes. Horn dressing combs come mostly from France

and England, at varying prices according to quality. Combs have been imported into India both from Germany and Austria, but the supply from Germany was larger than from Austria.

There is a growing demand for Japanese combs, which are cheaper than German or Austrian makes by 20 to 25 per cent, and larger supplies are being obtained from Japan in consequence of the cessation of supplies from Germany.

Horn combs are made in India in a number of places, for instance, in the Cuttack district; and celluloid combs are also made from imported celluloid sheets, for instance, at Jessore. Sandalwood combs are made in Mysore, and it is stated that they are largely used in Assam and the United Provinces.

Three descriptions of combs are chiefly sold, dressing combs, back combs, and tooth combs, which are made either of celluloid, india-rubber composition, horn, or metal. Back combs are made principally of india rubber. Tooth combs are made mostly of horn and to a smaller extent of metal.

[By Consul James O. Laing, Karachi.]

Comb making is not an industry in northwestern India. A few local handmade combs are used here, but those who use them would probably not buy any appreciable quantity of imported goods. Jewelers frequently make combs to order, but imported combs would hardly compete with these locally made articles. Celluloid combs are made in India from imported celluloid, chiefly at Jessore, in Bengal. The industry is not of sufficient importance to affect the general market. Imports are chiefly hard rubber, celluloid, horn, or metal.

There is a sale here also of small combs used by campers or hunters and by men stationed in outlying places where large, expensive, or bulky objects are at a discount, owing to difficulties of transportation, repair, etc. European women here wear the same kinds of side and back combs as in the United States. Expensive articles are not in demand.

Austria-Hungary and Germany supplied large quantities of rubber composition, celluloid, and cheap metal combs, while cheap horn combs came from Italy. A better horn comb, usually rather highly decorated, was and is imported from England and France.

The native women use the same type of tooth comb as the Europeans, but in this district do not use many side or back combs. Parsi women often use a number of combs for dressing their hair, as they seldom wear hats, but throw a light piece of silk or other material over their heads.

A tooth comb of white metal, short (about 3 to 4 inches), is commonly sold at retail in Karachi for 16 to 32 cents. An imported celluloid dressing comb about 6 inches long sells for 48 to 64 cents.

CANDLES.

Candles find an immense use in India, but the competition of candles supplied from Burma is gradually driving out European or American made candles, which do not compete in price, except for special qualities. Unless American candles can be sold in India at a cheaper rate than European-made candles, they are not likely to

have much success in the India market. It may be possible, however, for one of the American oil companies to place candles on the market at such low prices as would enable them to secure a foothold in India.

CHRISTMAS RETAIL TRADE.

In making inquiries among leading retail shops in Bombay as to the character of their Christmas business this (1913-14) season, the nature of the goods sold, etc., I found that the trade in some instances has been abnormally slack, owing apparently to numerous ordinary customers, especially of the wealthier native class, having met with severe losses through the recent financial panic and failures of banks. Many persons, while not abstaining from Christmas purchases, were less liberal than usual and inclined to postpone Christmas shopping until the last few days before Christmas.

The trade, nevertheless, possessed certain interesting features, such as the special demand for attractive novelties of every sort. Generally speaking, most of the articles purchased were of English manufacture, except toys, which were chiefly from Germany, and certain kinds of art goods and novelties from Japan.

OBSTACLES TO AMERICAN TRADE.

In making my investigations, it was evident that American participation in Bombay's holiday trade was small in amount, and that, except in several instances, the retail firms of Bombay had not been satisfied with their dealings with American manufacturers and export houses as regards the holiday trade, consequently were not in a mood to extend their orders for the next Christmas season. Among some of the complaints which came to my notice may be mentioned five instances in which, to quote one local merchant, "We were let down badly."

In the first instance, it may be mentioned that a Bombay firm early in 1913 ordered some ice-cream freezers, ice chests, and refrigerators from the United States, and advertised them for the holiday trade in their catalogues at the prices quoted by the American firm's representative in Bombay. Seven months after the order was given the American firm wrote to say that they could not furnish the goods at the prices quoted.

In the second instance an American firm, entirely on its own initiative, shipped to a Bombay firm a lot of men's and ladies' ready-made suits which were unsuitable for India. The Bombay firm to whom they were consigned refused to take up the documents and left the goods lying at the docks. Among the consignments, however, were certain goods which the Bombay firm badly wanted to sell, and could have done so, had they not been mixed up with other goods they did not want and covered by the same shipping documents.

In the third instance an American firm duplicated an order, shipping the same goods twice, thus causing a great deal of needless trouble and correspondence.

In the fourth instance, an American firm made out its invoices badly, undercharging for certain articles it sent and charging for other articles which were never sent at all.

In the fifth instance a local firm, to quote its own language, "gave an open order to a certain American firm to send us some American

toys, and this firm actually sent us toys which they had bought in Germany, and you will readily conclude that they are now crossed off our list of suppliers."

AN AMERICAN SUCCESS—THE PERVERSING CHRISTMAS CUSTOM.

On the other hand, one leading firm in Bombay was much encouraged with its success in selling pressed glassware, known locally as "crystal" ware, its first importation of this kind from the United States. The firm said that it was very well pleased with the shipment and that it was so well packed that it arrived with scarcely any breakage.

An interesting feature of the holiday trade, according to the statements of several firms, was the evidence afforded of the increasing number of Mohammedan and high-caste Hindu ladies who now do Christmas shopping. The "purdah" system, which has excluded such ladies from appearing in public or from the view of the opposite sex except their own relatives or husbands, seems to be fast breaking down, and even when ladies continue in "purdah"—that is, out of the sight of men or with their faces heavily veiled—they nevertheless seem to take more interest in the shops than formerly, and arrange for private inspection of goods and for purchase through their husbands or through female attendants.

Although India is not a Christian country and Europeans are a very small minority of the whole population, yet the spirit of Christmas seems to pervade all classes of people. While the lower classes of natives may only look on Christmas as a pleasant opportunity for receiving special "backsheesh" from their employers and a much-desired holiday, yet the upper classes of natives as well as the European element consider the occasion as one on which it may be necessary or desirable to give liberally in presents.

It is not permissible under the Indian civil-service regulations for Government officials, who comprise perhaps the most important part of the European population, to receive gifts of any sort except fruit or flowers; consequently the native desire to show good will toward such officials has to be restricted to such products of the vegetable kingdom. The widespread custom, however, of giving fruits and flowers to Europeans at Christmas time seems to have become enlarged as regards presents between natives themselves to include all kinds of provisions, and all the leading firms of Bombay report an extraordinary demand in their provision departments at Christmas time. This is partly owing to the special native trade and partly to the fact that Europeans themselves entertain liberally at Christmas time, giving large dinner parties, etc. American canned fruits, asparagus, pickles, etc., seem to share largely in such special trade. The wholesale dealers in such articles state that orders for provisions for the Christmas season are booked months ahead.

THE CHARACTER OF GIFTS.

Among the poorer natives one of the most important articles of Christmas trade is cheap boots and shoes, the wearing of such articles when they can be afforded becoming more and more popular. Any

gifts of the useful sort are very acceptable to natives, including, for instance, lamp ware, and especially American hurricane lamps.

Among the various articles which, generally speaking, seem to be very popular as gifts may be mentioned jewelry of various kinds, especially wristlet watches, also silver articles of all descriptions, including cases of hair brushes, manicure sets, and bowls for serving claret, or cups for champagne or other cooling drinks, which are sometimes a welcome substitute for afternoon tea in a hot climate. In drapery goods, chiefly from England, but also from France, Germany, Switzerland, Italy, Austria, and the United States, there is also a good Christmas demand.

As India is a country where people do an exceptional amount of traveling in order to get changes in climate and in the course of their business, and also in making frequent visits to England, traveler's requisites are much in demand for Christmas trade, such as trunks, handbags, dressing cases, etc. American safety razors and American fountain pens seem to meet with good sale here. Among "random" suggestions presented by one leading firm in its display advertisements for Christmas shopping were mentioned, for men, in addition to safety razors, "attaché" cases, useful to business men for carrying private letters and papers, made of English brown leather and costing about \$3 to \$5 apiece; for ladies, handbags in all kinds of leather, to match any costume, and costing about \$1 to \$14 apiece; also cases of perfumery, about \$3 to \$4.50 each; for boys and girls, drawing instruments, about \$1 to \$2 each; and hair brushes, in black, ebony, and white bristle, for about 75 cents each, especially suitable for school girls.

In the book line the demand was heavy, but all the books for Christmas presents were made in England or India. Books on topics connected with India, natural history, and sporting and military topics seemed popular, especially when in fine bindings; also all kinds of novels or light reading.

THE TOY TRADE—EXPENSIVE NOVELTIES.

As regards toys, most of the articles imported were from Germany. The children in India seem to have much the same taste as regards toys as children in other countries, with some special predilection, however, for miniature animals, not only Teddy bears, but also elephants, monkeys, tigers, and camels, which are peculiar to the fauna of India. Particularly good selling articles were monkeys placed on rollers of uneven circumference, so that when drawn by a string they would make a hopping motion characteristic of such animals.

The native princes and nobility of India frequently make very extensive purchases at Christmas time, and their taste runs largely in the direction of novelties of various sorts. For instance, alarm jewel boxes were in great favor this year. These boxes are constructed with an electrical device, so that in case they are moved by an unauthorized person after having been wound up or set they immediately make a loud noise, such as would quickly scare away a thief or cause his capture. The sale of musical instruments, guns, etc., as well as fine jewelry and silverware, to such important and wealthy individuals during the holiday season, always attains important dimensions.

CARDS AND CALENDARS.

Christmas cards and calendars have an immense vogue in India, and it is the custom for persons to remember even rather remote acquaintances in this way, and thousands of such remembrances are sent to friends and relatives in England as well as in India and elsewhere.

OPTICAL GOODS.

There is considerable trade in India in colored eyeglasses, especially the kind known as nonactinic glasses or glare protectors that sell for about \$5 each. They protect both from the sun and from the dust, and it is a great relief to wear them in traveling in India, for the sun's rays are extraordinarily powerful, causing headaches and sun-stroke. There is great prevalence of eye diseases among the natives. I know of one oculist who performs about 50 operations a day for cataract.

Most of the optical goods used in India are obtained from the United Kingdom. Dealers in optical goods also handle surveying instruments, compasses, and various kinds of scientific apparatus.

STATIONERY TRADE.

The Advocate of India, published in Bombay, reviews as follows the stationery trade of India as affected by the war:

As one among the principal effects of the war, here in India, may be mentioned the shortage of stationery supply and the consequent rise in its price.

This universal commercial as well as domestic requirement was, up to the outbreak of the war, chiefly imported from Germany, and now that those imports have ceased, India has to look somewhere else for her stationery supply before the present stocks are exhausted.

A leading stationer in Bombay has furnished an Advocate representative with some interesting facts in connection with this trade. Our representative was told that in the ordinary course the present stock in India, more particularly in Bombay, with the exception of those of a few leading stationers, could last only for about six months or so. The leading stationers, it is believed, have a stock to last them for a year or a few months more.

At present the manufacturers of the United States of America are naturally looked upon as the people best able to supply the stationery in future. A large number of inquiries asking for samples, quotations, etc., have already been sent to that country by many stationers and replies are expected shortly.

The United States manufacture almost all articles of stationery which Germany does—or used to do—and the prices are more or less the same. But owing to the vast difference in freight the German-manufactured goods had obtained a firm hold in the Indian market.

[For information concerning paper trade of India, see an elaborate discussion of the same in Special Consular Reports No. 73, "Paper Trade of the World," for sale at 50 cents per copy by the Superintendent of Documents, Washington, D. C.]

PENCILS AND PENS.

No separate statistics can be given of India's imports of pencils, as they are included under the general heading "Stationery, excluding paper." The value of imports under that head has risen progressively from \$1,564,920 in the fiscal year 1910 to \$2,269,620 in the fiscal year 1914. The imports in the latter year were mainly from the United Kingdom (\$1,613,520), Germany (\$199,360), Austria-Hungary (\$184,680), Japan (\$97,200), and the United States (\$92,340).

One difficulty that confronts the Indian pencil-making industry is the supply of suitable wood. No wood has been found of the same class as the soft cedar used in Germany and the United States, but the possibilities of Indian woods for pencil manufacture have not been fully exploited. The Indian Forest Research Institute at Dehra Dun

as considered this question on several occasions since 1908 and has had a number of promising woods tested by pencil-making firms. The latest conclusions are that the best timber procurable in India, so far as ascertained, is *Juniperus macropoda*, found in the dry hills of Baluchistan.

LOCAL PRODUCTION OF PENCILS AND CRAYONS.

There are a few small factories making pencils in India. The customary defects of the Indian pencil are that the wood is difficult to cut and the "lead" too hard. They are scarcely of the same class as the better imported pencils, which are largely Faber or Hardtmuth pencils. In the cheaper grades the Indian manufacturer has now also to face Japanese competition. The Japanese pencils are the cheapest in the market, the prices ranging from 18 to 32 cents per gross c. i. f. Calcutta. Indian-made pencils of white wood, varnished, sell at about 28 cents per gross at Calcutta. The Swan brand and Johann Faber's No. 234 are popular and are sold in large quantities.

An industry of considerable promise in India is the manufacture of chalk pencils. Indian-made white crayons are quoted at \$12.49 per case of 100 boxes, each containing 144 sticks, f. o. b. any railway station in India; they are also packed in 25 and 50 gross cases for the convenience of schools at an extra charge of \$0.40 and \$0.80, respectively. Colored crayons wholesale for \$16.66 per case of 100 gross boxes, f. o. b. any railway station in India; at retail, packed in 12-gross cases, they bring \$3. The foregoing prices are those of a Punjab company that recently started this industry.

DEMAND FOR PENS.

Fountain and stylographic pens are in general use in India. The fountain pens are imported from both the United States and England, while the stylus are mostly from Great Britain. A combination fountain pen and stylo, English make, using two different colored inks, is also in use here.

Competition is so keen that these articles are sold here as cheaply as in the United States and England. There are many large schools as well as many business houses employing large numbers of clerks, and many of the pupils and most of the clerks use fountain pens, making the demand good. After giving satisfactory evidence of the value of the pens, the best arrangement would be to secure one of the older-established houses with good up-country connections to take the agency. Beyond doubt the best results are obtained from representatives who visit this country, note the conditions, and meet personally the members of the firms who are to act as agents.

CHRISTMAS CARDS.

It may be explained that leading people in India pick out a particular type of Christmas card which pleases them, usually one which folds, and then have a Christmas and New Year's greeting printed on them, their own names being printed in the text. Sometimes several hundred or more such cards are sent out by one person. Some of the cards have no illustration except a crest or monogram, but, as a rule, interesting and attractive illustrations are preferred, frequently of some scene characteristic of India.

As many of the presents and remembrances purchased for Christmas time in India are transmitted to England and other distant countries, the Christmas purchasing season usually begins in earnest

rather earlier than in some other countries. The last Christmas mail from India to England in 1913, due to arrive there just before Christmas, amounted to 1,238 bags, containing 980,000 separate articles. This was just about double the normal weekly mail to England.

AUTO STATIONERY.

It is natural to find a great increase in the vogue for Christmas "auto-stationery," as it is called. This comes in boxes and is the nearest possible approach to the private Christmas card. It is obviously an attempt to strike a happy mean between the ordinary card and the private one. It seems very successful. The stationery has pretty designs upon it and the line or two of formal greeting, and the sheets can still be used as ordinary note paper for a few words of personal greeting. This year's calendars are well up to the high standard so long set. But here again the subdued note reigns. The huge elaborated wall calendars have disappeared and their place is taken by others, smaller and not so elaborate, but very pretty and more in keeping with modern ideas of making a room attractive.

HOLIDAY CARDS IN SOUTH INDIA.

[By Consul José de Olivares, Madras.]

There is a large demand throughout South India during the three months preceding Christmas, New Year's Day, and Easter for gift cards suitable for those holidays. Such cards are similar to those used on like occasions in the United States, except that the verses and mottoes employed are generally of English origin. The materials used are miscellaneous kinds of cardboard and, to a limited extent, celluloid, made up in cards and as folders with worded inserts, fastened with silk ribbon or cord. Ornamentation consists of the customary chromatic, embossed, and hand-painted designs. The cards most in demand are of small and medium sizes suitable for mailing. The retail prices range from 4 to 50 cents per card (with envelope), the demand being largest for those selling for 10 to 20 cents.

Holiday cards are sold here by all department stores, and usually by stationers, confectioners, and dealers in photographic supplies. The cards are entirely of European manufacture, and in originality, artistic design, and quality are generally inferior to those made for the same purposes in the United States.

PRINTING OFFICE SUPPLIES.

[By Consul José de Olivares, Madras.]

There are approximately 275 printing establishments in this consular district, which comprises all of southern India. Of this number about 25 per cent employ an average of 100 compositors each, while the total number of compositors would probably exceed 10,000.

A majority of compositors hereabouts are natives, who as a rule are not inclined to be progressive and are not apt to appreciate adequately the advantage of superior, up-to-date tools. Printers' tools are rarely purchased by compositors, they being usually provided by employers.

It is estimated that about 25 per cent of the printers' tools in use in southern India are of American manufacture. The remainder are of European importation and comparatively cheap.

AMERICAN TYPE SYSTEM GAINING HEADWAY.

The American point system of type measurement is just coming into use in this consular district and gives promise of gaining headway, as it is proving popular where it is employed.

No printers' trade magazines are published in this district. Advertising by circular letter is much resorted to by business houses seeking trade openings in this country, and where such letters are attractively prepared and treat of commodities for which there is a demand this system of propaganda is frequently effective. There are no postal regulations or duties in the Madras Presidency on printed circulars or imitation typewritten form letters of a legitimate nature.

The customary terms of settlement with supply houses in Madras vary from cash to 30 or 60 days' draft against documents, according to the general business standing of a customer. Quotations are usually preferred c. i. f.

[By Consul M. K. Moorhead, Rangoon.]

PRINTING PRESSES AND TOOLS IN BURMA.

There are five large printing establishments in Rangoon and very many small native presses. Outside of Rangoon there are no presses employing daily 20 persons or over. Nearly every city has, however, one or more small printing establishments under native management. The average number of persons daily employed by the five large printing establishments in Rangoon is 989.

The compositors are mostly natives and are not progressive enough to appreciate the advantage of up-to-date tools and equipment. Tools are supplied by the employers, who purchase only the very cheapest English-made instruments. American printers' tools are used to a very small extent. Compositors are paid \$7 to \$15 per month. The American point system of type measurement is largely gaining headway over the European system.

No printers' trade magazines are published in Burma. Advertising is done principally in the daily newspapers. Circular letter advertising is used to a small extent and appears to be fairly effective. Advertising matter, such as printed circulars, when imported in bulk pays a customs duty of 5 per cent ad valorem.

There is only one supply house dealing in printers' tools. This house sells to local purchasers on one month credit basis and prefers to have quotations c. i. f. when possible, otherwise f. o. b. New York.

TYPEWRITERS AND CARBON PAPERS.

The enterprise now being shown in India by various American typewriter companies, which are rapidly extending their sales of typewriters, suggests that there should also be a favorable field in India for the more active promotion of business in carbon paper and typewriter ribbons manufactured in the United States. The backwardness of this particular feature of the typewriter business in India was called to my attention during recent travel in India, while stopping at

smaller towns, where it was easy to rent temporarily American typewriters for preparing official reports and correspondence, but where it was difficult to secure good ribbons and carbon paper for making clear impressions for duplicate copies. The common fault in such copies was a generally blurred and cracked appearance of the lettering and the soiling of the rest of the paper, which should be perfectly white. The chief reason for such defective results is that dealers in typewriter supplies are too often stocked with cheap but inferior goods, which show serious deterioration in the Indian climate and become specially damaged when the weather is unusually damp, as in the rainy season.

At present probably about one-half of the carbon paper and typewriter ribbons used in India is sold by various branches of one American typewriter company. The remainder of the trade in such goods appears to be about equally distributed between two American firms and one London firm. Still another London firm has lately been making a bid for a share of the trade in carbon papers.

INCREASING USE OF AMERICAN TYPEWRITERS.

Of the 6,267 typewriters imported into India in 1913-14, the United States supplied 4,602 and the United Kingdom 1,533, while in the preceding year the United States contributed 4,106 and the United Kingdom 1,452 to the total of 5,677.

Typewriters are still a good deal of an innovation in India, where a great majority of small business firms even now have their correspondence written out by hand. But following the example of larger firms and Government departments, their use is rapidly gaining ground among the smaller business people, especially native merchants. Quite recently typewriters have been introduced into India which can prepare correspondence in the characters of the Urdu, Marathi, and Gujarati languages, the most important native languages of the country. Many new typewriting schools have been started, chiefly for native typists, and this is becoming a favorite mode of employment.

With the greatly increasing use of typewriters in India, it obviously follows that the market for ribbons and carbon papers has also rapidly expanded. Conditions are now so promising for much further expansion of business that the field is certainly worthy of serious attention from American manufacturers.

Official Government and military letters in India are typewritten in black, but commercial correspondence ordinarily makes use of purple ribbons.

ADAPTATION OF TYPEWRITER TO BENGALI.

An important stimulus to the sale of American typewriters in India is anticipated as a result of a recent invention whereby an American typewriter already in extensive use in India can have adapted to it an arrangement for printing the 360 characters and signs of the Bengali alphabet. This typewriter had previously been adapted to write in seven Indian vernacular languages.

Not only the large number of characters and signs in the Bengali alphabet, but the spreading style of many of them made it difficult to

devise a method whereby they could be conveniently carried on a typewriter keyboard. Through this invention, now patented in India, the whole of the Bengali alphabet is adapted to be written on a typewriter machine having a single shift motion and 46 type blocks, each block carrying two characters or signs. The invention apparently can not be made use of by machines having a type guide whereby the printing point is restricted within defined limits or by shuttle or type-wheel machines. The patent specification for the new typewriter mentions that the letter characters comprised in the Bengali alphabet include many that are alike in the body portion and differ only in the accompanying vowel or consonant signs. Similarly many letters and characters contain small portions that are identical. The 360 characters and signs of the alphabet are practically reduced in number to 92, and the alphabet is thus brought within the compass of an ordinary typewriting machine.

The Bengali language is spoken by the native element in Calcutta with its vast commercial interests and in the smaller cities of north-eastern India, where there are large numbers of business men and officials. The average Bengali is better educated than most other natives and a large number take readily to commercial work. Typewriting positions can be filled at Calcutta at as low as \$10 per month, but up to this time they have been restricted to English offices.

MARKET FOR GLUE.

There is a large business in India in the sale of glue, as well as of all classes of sizing materials for use in the local textile industries. In Bombay most of such business has been done in German goods and handled by German and Parsi agents, together with one English firm, who are continually working among the various cotton mills to obtain orders, these being the largest consumers. There is considerable competition in such trade.

No glue is made anywhere in India, as climatic conditions here seem to render it impossible, so that there is always a good opening for its import into this country, provided prices are suited to the competitive conditions.

An English firm which has an important sale of its goods here, to meet the special Indian demand, has introduced bazaar glues, the chief varieties of which are as follows: Pale (Scotch quality), 10 by 1½ inches; Ruby (Scotch quality), 10 by 1½ inches; Dark Bone, 10 by 1½ inches; Opaque, 10 by 1½ inches; Strip, 10 by 1½ inches; Strip, 7 by 1½ inches; Strip, 6½ by ¼ inches. Also five varieties of powdered glues of concentrated size are sold for this market, two being especially suited to meet low-price conditions. For convenience of customers such glue is packed in packets when required at prices slightly higher than when in bulk, the sizes being 1 pound, ½ pound, and ¼ pound.

PRINCIPAL CROPS.

JUTE.

India is the world's chief jute producer. To this crop an area of 3,169,600 acres was devoted in 1913-14, against 2,970,500 acres in 1912-13, and 3,150,400 acres as the average for the preceding five years; and from this acreage were harvested 8,751,800 bales (of 400 pounds each), against a production of 9,842,800 bales in the preceding year and an average of 7,900,400 bales for the half decade. Shipments of raw jute represented 25 per cent of the value of Indian raw produce and 12.5 per cent of the total exports.

The world's annual demand for jute is estimated at about 10,000,000 bales, India being, as stated, virtually the sole producer, although the plant has been cultivated in Mexico, Africa, Algeria, Formosa, and elsewhere, but with indifferent results. The high prices of jute are beginning to cause some uneasiness as to the possibility of inventing a substitute, such as jute textile. At present, however, inventions have not been so successful as to affect the trade. Jute, as the cheapest fiber on the market, is in constant demand in Europe, being used not only for the manufacture of bags, as in earlier days, but also for carpets and rugs, which, though not durable, are showy and cheap. Practically the whole season's jute comes into commercial use during the official year ending March 31, but it is customary in the trade to deal with exports for the 12 months ending June 30.

The following table gives the area, the yield, estimated mill consumption, and exports in round numbers for the last four years:

Year.	Area	Yield	Mill con- sumption (esti- mated).	Exports.
	Acres.	Bales.	Bales.	Bales.
1910-11.....	2,938,000	7,932,000	3,863,000	3,550,000
1911-12.....	3,106,000	8,235,000	4,561,000	4,641,000
1912-13.....	2,970,000	9,843,000	4,967,000	4,966,000
1913-14.....	3,170,000	8,752,000	4,435,000	4,310,000

The consumption of jute outside the mills is estimated to be about 500,000 bales a year, which has probably been restricted by the wider use of mill-made goods. During 1913-14 the largest purchaser of raw jute was the United Kingdom, which took 1,626,066 bales, while Germany took 886,928 and the United States 659,366 bales. France, Austria-Hungary, Italy, and Spain came next in order, with Russia, Belgium, and Japan taking smaller quantities.

Two varieties of the jute plant are cultivated as a crop, *Cochchorus capsularis* and *C. olitorius*. Jute growing is confined almost entirely

to Eastern Bengal, in the Ganges-Brahmaputra Delta. The crop requires a rich moist soil. Owing to river inundation this part of India receives a considerable alluvial deposit every year, and the land is thus able to sustain this exhausting crop without manure. The crop is rather delicate when young, but once established requires no attention and grows to a great height (10 to 11 feet). Before ripening the crop is cut and retted in water. After about three weeks' submersion the fiber is removed by washing and beating. At the present high range of prices jute may be considered to be the best-paying crop in India. Special Agents Series No. 74, "Linen, Jute, and Hemp Industries in the United Kingdom" [for sale at 25 cents per copy by the Superintendent of Documents, Washington, D. C.], contains 27 pages of detailed information in regard to the jute industry in India, giving description of mills, kind of labor, wages, production of jute, etc.

WHEAT.

India produces about one-tenth of the world's wheat. It is cultivated widely throughout northern India as a winter crop, the majority of the varieties grown belonging to the species *Triticum vulgare*. Indian wheats are white, red, and amber-colored and are mostly classed as soft from a commercial point of view. The grains are plump and well filled, but the samples are spoiled through mixtures of various qualities. Indian wheat is generally adulterated to some extent with barley and largely with dirt from the threshing floor; and although there is a good demand in England and the Continent for the surplus produce, prices compare unfavorably with those obtained for Canadian and Australian grain.

Customarily the crop is grown after a summer fallow and, except in irrigated tracts, depends largely on the conservation of the soil moisture from the previous monsoon. Rains in January and February are beneficial, but an excess of rainfall in these months usually produces rust with a diminution of the yield. On irrigated land two to four waterings are given. The crop is harvested in March and April, and the threshing and winnowing go on up until the end of May. In good years the surplus crop is bought up at once by exporters, and no time is lost in putting it on the European market, as other supplies are scarce at that time of year. In periods of famines the local price is generally sufficiently high to restrict exports.

General seasonal conditions in 1912-13, on the whole, were not very favorable, the crop being estimated at 9,853,000 tons, as compared with 9,924,500 tons in 1911-12. The exports were about 12 per cent of the total estimated production. The principal purchasers of Indian wheat were the United Kingdom, Sweden, Germany, Belgium, France, and Italy. Almost all is shipped during the months of May, June, July, and August. The 1913-14 crop was estimated at 8,354,000 tons.

A much augmented area is under cultivation for the 1914-15 crop, a special official forecast for the season showing an increase of 3,684,000 acres, or nearly 13 per cent over the final estimate for the

preceding year. The distribution of this wheat acreage, by Provinces, is:

Districts	Acres.		Districts.	Acres.	
	1913-14	1914-15		1913-14	1914-15
Punjab ¹	9,588,000	11,242,000	Bengal.....	144,000	135,000
United Provinces.....	6,406,000	7,263,000	Ajmer-Merwara.....	5,000	18,000
Central Provinces and Berar ¹	3,384,000	3,421,000	Central India.....	2,684,000	3,090,000
Bombay and Sind ¹	2,592,000	2,840,000	Rajputana.....	622,000	899,000
Behar and Orissa.....	1,342,000	1,218,000	Hyderabad.....	702,000	855,000
Northwest Frontier Province.....	992,000	1,165,000	Mysore.....	3,000	3,000
			Total.....	28,464,000	32,148,000

¹ Including Native States.

It will be seen that the area this year as against that on the corresponding date last year shows an increase per cent of 45.5 in Rajputana, 44.2 in the United Provinces, 39.9 in Hyderabad, 26.3 in the Northwest Frontier Province, 22.3 in the Punjab, 18.6 in Central India, 15 in Bombay and Sind, and 6.8 in the Central Provinces and Berar. The percentage decrease is 9.4 in Behar and Orissa and 6.2 in Bengal.

On the whole, the condition and prospects of the crop are very favorable, except in the Provinces of Behar and Orissa and Bengal, where the wheat crop is not of much importance, representing only 5 per cent of the total of India.

The Government of India has prohibited absolutely the exportation of wheat from India on private account for the whole period up to March 31, 1916. The firms ordinarily engaged in the exportation of wheat from India have been appointed the agents of the Government for the purpose of carrying on the trade under the orders and for the account of the Government of India. The maximum price to be offered by these firms to Indian sellers, instead of being regulated by the price ruling in London, will be determined from time to time by the Government of India and announced on its authority. As the season progresses these maxima will be gradually reduced so that there can be no inducement to speculate for a rise or to hold supplies. The maximum price will be the maximum at the port, and firms must offer upcountry only such prices as, with the addition of the railway charges, will not exceed this maximum. The necessary variations from the standard maximum will be fixed for the various recognized qualities of Indian wheat.

RICE.

India's share of the world's production of rice is no less than 46 per cent; its crop exceeds that of China and forms nearly one-half of the total production of all Asia. To rice is devoted a larger acreage than to any other crop in India. In 1913-14 this cereal represented 59 per cent of the value of food grains exported and 11 per cent of the total exports from India. Exports in the year named formed 9 per cent of the total estimated production, which was 28,167,000 tons, against 28,484,000 tons in 1912-13.

The rice trade is much less susceptible to the influences of the seasons than most food grains, being grown for export mainly in Lower

Burma, where failure of the rains is unknown. Foreign exports, however, are affected by conditions in other parts of India. The failure of the monsoons in the Indian Peninsula at once creates a demand for rice from Burma at prices to which the range of prices in foreign markets does not correspond, thus causing a diversion to domestic markets of rice that would otherwise be exported from Burma to foreign countries. The largest quantity ever exported was in 1912-13, when 2,763,321 tons were shipped; in 1913-14 there was a decline to 2,452,000 tons. India is the largest exporter of rice in the world, its product going to every quarter of the globe.

The final official forecast of the rice crop of India for the 1914-15 season, based on returns from Provinces that contain 99 per cent of the total area under rice in British India, shows an acreage of 76,181,000, which is 1 per cent larger than the revised figure of last year. The total estimated yield is 27,964,000 tons of cleaned rice, a decrease from the 1913-14 figures. The three important Provinces of Bengal, Bihar and Orissa, and Burma account for the decrease in yield.

RICE CULTIVATION AND MILLING IN BURMA.

[By Consul Maxwell K. Moorhead, Rangoon.]

The cultivation and milling of rice is by far the most important industry of Burma. Out of a total cropped area of 14,295,499 acres during the year ended June 30, 1913, there were 10,218,813 acres under rice, as compared with 9,824,158 acres in the preceding season. The Government forecast of the area under rice during the crop year commencing July 1, 1913, reaping of which began in December, 1913, is placed at 10,133,018 acres. About two-thirds of the cultivated area of the Province is located in Lower Burma, and of this area nearly 90 per cent is devoted to rice. In Upper Burma approximately 50 per cent of the cropped area is under rice.

In Lower Burma rice is sown in June and reaped in December or January. The rainfall is heavy, ranging from 170 inches in Akyab to 40 inches in Prome during the period June to October. Irrigation is thus unnecessary. Cultivation of rice in Lower Burma is simple and primitive. No fertilizers are used other than the ashes of the stubble, which is burned each year at the end of the hot weather. In June, or as soon as the ground is covered with water and the soil becomes soft, plowing is commenced. Primitive, locally made plows or harrows are used, which scratch up the earth to a depth of a few inches. Seeds are usually sown in nurseries and about one month afterwards, when the plants are a foot high, transplanted to the fields.

In the dry zone of Upper Burma the annual precipitation ranges from 15 to 30 inches. To make up for lack of rain the Government has constructed canals and tanks for irrigation. The principal irrigation works are the Mandalay, Shwebo, Mon, and Yeu Canals. During the crop year ended June 30, 1913, the irrigated area amounted to 1,091,646 acres, and 90 per cent of this area was planted under rice. In Lower Burma only one crop a year is grown, as the rainfall is confined to a period of six months. In Upper Burma by means of irrigation as many as three crops are grown in some few sections.

NATIVE IMPLEMENTS.

Throughout Lower Burma rice growers still use the "tun," "tundon," or "hton." This is a sort of harrow consisting of a log of wood fitted with four to seven wooden teeth. These harrows, which weigh from 60 to 120 pounds and cost \$3 to \$7 each, are dragged about by a pair of water buffaloes, if the soil is marshy, or by oxen on lighter soil. The ground is scratched up to a depth of a few inches only. Sometimes young buffaloes are driven up and down the field to stir up the ground. The field is usually harrowed four times in one direction, and then cross-harrowed four times at right angles.

In less fertile lands a very primitive plow, called the "htè," is used instead of the harrow. This plow has a stock of teak wood and a plowshare of steel or iron. It is more of a grubber than a plow. It weighs about 60 pounds and costs about \$1.50. Another variety of this plow is used in Upper Burma and the Shan States.

Other agricultural implements in use are a "kyandon" or "kyanbaung," a clod crusher; a "pauktu," or hoe; a "daw," or long knife, used for reaping. Sowing and reaping are done by hand. Harvesting machines, steam plows, and other modern agricultural implements and machinery are unknown to rice cultivators in Burma, and under present conditions could not be sold in this district. The Department of Agriculture at Mandalay, Upper Burma, is, however, trying to induce the cultivators to use more efficient implements. On the Government experimental farm imported plows and cultivators are in use and for sale.

DESCRIPTION AND PRICES OF IMPROVED IMPLEMENTS.

The following is the list of improved cultivating implements recommended and for sale by the Burma Department of Agriculture, with net price in United States gold at which they are sold in Rangoon or Mandalay:

1. Large iron plow, the "Beeloo"; price, \$8.44. This plow is of general utility and works well on all soils—irrigated or unirrigated. It plows to a good depth and is very useful in getting land prepared quickly or in helping to free it from weeds. One plowing is equal to three or four with the "htè." It is excellent for large holdings where deep cultivation is required. A rod of iron for draft purposes is supplied with this plow. New shares cost only \$0.16 each and will last longer than the ordinary Burmese share.

2. Large iron plow, the "Zemindar"; price, \$8.44. Very similar to the above and does the same kind of work. New shares cost \$0.16 each.

3. The "Meston-Burma" plow; price, \$2.76. This is a "Meston" iron plow fitted onto the body of an ordinary Burmese plow. It does very good work and turns over a deeper furrow than the "htè." It is easy of draft and prepares soil for sowing quickly and well. New shares cost only \$0.12 each.

4. Small cultivator; price, \$37.31. This cultivator runs on three wheels and has seven teeth which stir up the soil. Two or more teeth can be removed if desired. It does excellent work in land infested by weeds, and for rapidly preparing fields for sowing dry crops it is unequalled. Useful only on large holdings, as the cost is high.

5. Bullock hoe or cultivator (Planet Jr.); price, \$12.98. This implement can be used for many purposes: (1) As a cultivator before sowing. It has five iron teeth and does work similar to No. 3, though it is not so strong and does not usually cultivate quite so deeply. It is easily drawn by a pair of bullocks and is an excellent weed eradicator and preparer of the soil. Does three times the work of the "hton." (2) As a hoe or light cultivator between the rows of crops grown in lines. Two of the teeth can be replaced by hoe blades for cutting out the weeds, and by means of a lever

the teeth can be made to work close together or wide apart according to the distance between the rows of plants. (3) It can be used for making ridges. As the cost is somewhat high it is not to be recommended for very small holdings.

6. Bullock cultivator; price, \$7.79. This is an implement which is similar to No. 5. It is used as a cultivator to stir up the soil before sowing and also to weed and cultivate between the rows of crops grown in lines. It has five teeth and is an excellent weed eradicator and preparer of the soil. It is very light and can easily be drawn by small bullocks.

7. Hand hoe or cultivator; price, \$4.87. This is a light implement easily worked by hand. It can be used both as a hoe and as a small cultivator between the rows of plants. It is a most useful implement for gardeners and on small holdings and can be made to do many times the work of the "pauktu" in weeding groundnuts, chillies, vegetables, etc.

8. The "Angle" harrow; price, \$2.43. For description and uses, see Cultivator's Leaflet No. 22.

9. The seed drill; price, \$2.43. For description and uses, see Cultivator's Leaflet No. 21.

10. The "Gwinset"; price, \$8.76 to \$9.08. This is a most effective implement for pulverizing and puddling the soil of paddy fields. It cuts up and destroys weeds and will prepare a paddy field for planting more rapidly than any other implement. It consists of a wooden roller studded with small cutting blades which do the work as the roller revolves. It is not heavy work for bullocks and the driver sits on the top of the implement. It is in constant use in many parts of Burma. Any repairs can be made by an ordinary village carpenter, and new blades, if required, can be supplied at \$0.08.

The Department of Agriculture also manufactures for sale to cultivators a seed drill, a harrow, and bullock hoe. There are at present no dealers in Burma in plows and cultivators. American manufacturers of these instruments should send their catalogues and price lists to the Director of Agriculture, Government of Burma, Mandalay, Burma.

RICE CROP AND EXPORTS.

During the crop year ending June 30, 1913, the total production of unhusked rice in Burma amounted to 6,953,000 long tons, which is equivalent to 389,368,000 American bushels of unhusked rice, or 259,578,600 bushels of "five parts" rough cargo rice, or 233,621,000 bushels of cleaned white rice.

Large quantities of "five parts" cargo rice are shipped to Hamburg for milling and then reexported to the West Indies and South America. This is a trade which the large mills of Texas and other Southern States would be in a better position to handle. As the United States does not produce enough rice for home consumption, it is necessary to import paddy, or rough rice, from the Far East. Probably better rates could be obtained by purchasing direct from Rangoon millers than from Hongkong or Japanese brokers.

Increasing numbers of small, modern mills are yearly being introduced for village use in place of the primitive hand mills. One of the largest European millers estimates that there are about 500 rice mills of all kinds in Lower Burma, but this is probably an overestimate. There is no doubt, however, that a growing demand exists for small mills having a capacity of about 200 bushels of unhusked rice per day of 12 hours.

During the year ended December 31, 1913, rice mills of all kinds, valued at \$226,860 (as compared with \$63,500 in 1912), were imported into Rangoon from all countries, the imports being: From Germany, \$171,240; United Kingdom, \$53,620; United States, \$1,520; from all other countries, \$480.

The total productive power of the rice mills of Burma, excluding small native mills and hand-worked huskers, is estimated at 116,000,000 bushels of "five parts" cargo rice per annum.

EXPORT DUTY ON RICE.

Rice, husked, or unhusked, including rice flour, when shipped to foreign countries from Burma pays an export duty of about 6 cents per maund of 82½ pounds. This would be equivalent, approximately, to a duty of 3 cents per bushel of 40 pounds on unhusked rice, 4 cents per bushel of 60 pounds on rough cargo rice, and 5 cents per bushel of 66½ pounds on cleaned white rice.

RICE PROSPECTS FOR 1915.

The outbreak of war caused the loss of a large market for Burma rice, and the shortage of ships forced a drop in prices. Fortunately, the stocks on hand from early August to December, 1914, were practically all sold in India, but at a very low price. However, this demand has since fallen off, probably as a result of the prohibition of the exportation of wheat from India. The closing of the German rice mills by order of the Government of India has no doubt had considerable to do with the remarkable drop in the price of unhusked rice. Two of the mills were leased by a Scotch firm, which gives a practical monopoly of the milling to one or more English companies. Naturally, it is to their advantage to purchase unhusked rice at the lowest possible prices, but it is to the distinct disadvantage of the cultivators and to the prosperity of the Province to cut off all competition. These English firms also control the regular lines of steamers from Rangoon to England. In March, 1915, it was almost impossible for small, independent millers to obtain space for their shipments. This pressure, however, may be removed by the proposed establishment of the Ellerman Line of cargo steamers between Rangoon and the United Kingdom. The Ellerman Line has also leased the German-owned rice mills of Diekmann Bros., in order to be certain of obtaining cargoes. Unless the cultivators are able to obtain better prices for their paddy, the year 1915 will be disastrous.

SUGAR.

Notwithstanding a domestic production of cane sugar amounting to some 2,500,000 tons annually (or more than that of any other sugar-producing country except Cuba, and practically all of it consumed locally), India's purchases of foreign cane and beet sugar are steadily increasing. In 1911-12 India imported 612,090 tons, in 1912-13 772,150 tons, and in 1913-14 896,870 tons. The bulk of the cane sugar came from Java, but Austria-Hungary supplied beet sugar to the amount of 74,000 tons in 1913-14 and 52,590 tons in 1912-13. Germany also sent beet sugar, but in smaller quantities.

Although India is not naturally suited for sugar-cane growing, approximately 2,500,000 acres are sown yearly. The crop is mostly grown in the submontane tracts of northern India. The common varieties are thin and hard, yielding a low percentage of juice of fair quality. In India white sugar is not made by the grower, who simply boils down

the juice and does not remove the molasses. The product, called gur or gul, is generally sold and consumed as such, although in some parts a certain amount of sugar making is carried on. The profits, however, are small, owing to the cheapness of imported sugar, and there appears to be some danger to the crop if the present taste for gur were to die out. The question has been taken up by the Government, and a cane-breeding station has recently been opened near Coimbatore in Madras with the object of raising seedling canes and otherwise improving the supply of cane sets. Several sugar factories of a modern type have been erected within recent years in Behar and the United Provinces. The chief difficulty seems to be the obtaining of a sufficiently large supply of canes to offset the heavy capital charges of the undertakings.

Reports received from Provinces that contain 99.4 per cent of the total area under sugar cane in British India indicate for the 1914-15 season an acreage 9 per cent below and a yield 3 per cent above the revised figures of 1913-14, the final estimate of the 1914-15 crop being 2,315,000 acres and 2,367,000 tons, against 2,540,000 acres and 2,291,000 tons in 1913-14. The decrease in acreage, which occurs in all the Provinces except Bengal and Bihar and Orissa, is attributed to deficient moisture at sowing time and scarcity of seed cane as a result of the drought of 1913. Conditions somewhat improved later on, and the total yield is estimated, as stated, at a greater figure than in the previous year; it also exceeds the average of the preceding five years by some 6 per cent.

SUGAR FROM DATE PALMS.

An important opening may occur for American appliances now used in the maple-sugar industry of Vermont which might make possible the development of a similar industry in India for extraction and manufacture of sugar from the wild date palms that grow plentifully throughout central India.

The agricultural chemist of the Punjab Government, Mr. H. E. Annett, several years ago began an investigation of the possibilities of the date-palm sugar industry, which has existed in a small way only in the eastern part of Bengal, and as a result of his studies concluded that there ought to be important opportunities for profitable manufacture of sugar from date palms, especially in central India, and notably in the Native States of Gwalior, Indore, and Bhopal, where there are large forests of date palms.

REVIEW OF INVESTIGATIONS.

In a recent memoir published by the Agricultural Research Institute and College at Pusa, Mr. Annett, in giving an account of his work with reference to sugar-date palms, refers to the great improvements that have been introduced into the corresponding American industry—maple-sugar manufacture—in which case it is to be noted that a juice containing only some 3 per cent of sugar forms the raw material. He mentioned that if those engaged in the maple-sugar industry of Vermont could afford to employ good appliances and perfected methods, it should certainly be possible to apply them to India's date sugar.

SACCHARINE CONTENT.

It is stated that the juice derived from date palms grown in the dry soil of central India is richer than that obtained in Bengal, experiments having demonstrated that whereas in Bengal one-seventh to one-eighth is the proportion of sugar derived from juice, 6 pounds of juice in central India yielded 1 pound of sugar. In the Native States of central India, in which it is suggested the date-sugar industry might be developed to greatest advantage, waste lands are frequent and the villages, as a general rule, are impoverished and not over-populated. There is one small Native State, Bagli, near Indore, including perhaps 50 or 60 villages, which contains over 150,000 date trees.

It has been shown in Mr. Annett's analyses that date-derived sugar, which is identical with and undistinguishable from cane sugar in the markets, is cheaper than the sugars imported from abroad. At present about the only use made of these date palms is that the leaves are used by the natives for thatching their huts, while from the sap they ferment a beverage known as toddy, which is freely drunk all over India.

DESIRE FOR AMERICAN APPLIANCES.

In interviewing some of the officials connected with the agricultural departments of southern and central India, I found a great interest manifested in the maple-sugar industry of the United States, and there was a keen desire to learn all that is possible concerning it, with a view of applying this American example to the date palms of India. Several of these agricultural departments are now making experimental tests to determine whether local date trees yield a juice capable of being profitably boiled down for the production of raw sugar. The Director of Agriculture of the Government of Hyderabad (Mr. John Kenny), the largest Native State of India, is particularly interested in this subject, and believes that the date palms of this State, which are now practically wasted, could be turned into one of its most important assets by the adoption of the methods and appliances used in the manufacture of maple sugar in Vermont. Mr. Kenny states that if the date-sugar industry can become well established in India there will be no further need for this Empire to import as now large quantities of sugar from other countries. He mentioned that he would be very glad to obtain from American manufacturers of appliances and machinery used in the manufacture of maple sugar all the data possible concerning the same, with a view to their adoption here.

COTTON.

Cotton is one of the chief exports from India and the crop is widely grown in the drier parts of the country. The lint is, generally speaking, short and coarse in fiber and unsuited for English mills. Cotton is a summer crop and requires a deep moist soil and light rainfall for its proper growth. Rain immediately after sowing or during the flowering period is injurious. In parts of central and southern India the seed is sown in lines and the crop receives careful attention, but in northern India it is sown broadcast (often mixed with other crops)

and from the date of sowing until the time of picking is practically left to itself. The average yield, which does not amount to more than 400 pounds of seed cotton per acre, could doubtless be greatly increased by better cultivation.

The area under cotton rose from 22,028,000 acres in 1912-13 to 25,020,000 acres in 1913-14, and the estimated crop, from 4,610,000 to 5,065,000 bales. The "final forecast of the cotton crop of India for the 1914-15 season" made by the Government shows 24,632,000 acres, or nearly 2 per cent short of the revised figure for last year, and a yield of 5,232,000 bales of 400 pounds each, or 3 per cent more than last year. Details by Province follow, those for 1913-14 and 1912-13 being final revised figures:

Province.	1914-15		1913-14		1912-13	
	Acres.	Bales.	Acres.	Bales.	Acres.	Bales.
Bombay ^a	6,700,000	1,495,000	6,574,000	1,439,000	6,064,000	1,324,000
Central Provinces and Berar.....	4,709,000	1,097,000	4,754,000	961,000	4,493,000	910,000
Madras ^a	2,383,000	323,000	2,725,000	308,000	2,414,000	471,000
Punjab ^a	1,855,000	474,000	2,053,000	612,000	1,575,000	373,000
United Provinces ^a	1,545,000	482,000	1,586,000	484,000	1,188,000	428,000
Sind ^a	351,000	121,000	341,000	135,000	296,000	123,000
Burma.....	282,000	48,000	290,000	54,000	233,000	46,000
Bihar and Orissa ^b	72,000	16,000	73,000	17,000	92,000	19,000
Bengal ^a	92,000	35,000	87,000	24,000	51,000	21,000
Northwest Frontier Province.....	60,000	13,000	59,000	14,000	56,000	13,000
Ajmer-Merwara.....	54,000	15,000	57,000	15,000	50,000	26,000
Assam.....	34,000	12,000	33,000	12,000	35,000	10,000
Hyderabad.....	3,605,000	400,000	3,653,000	400,000	2,888,000	300,000
Central India.....	1,520,000	292,000	1,426,000	273,000	1,314,000	208,000
Baroda.....	843,000	229,000	749,000	175,000	762,000	196,000
Rajputana.....	420,000	108,000	470,000	132,000	393,000	125,000
Mysore.....	107,000	12,000	90,000	10,000	154,000	19,000
Total.....	24,632,000	5,232,000	25,020,000	5,065,000	22,028,000	4,610,000

^a Includes Native States within provincial boundaries.

^b Excluding Native State for which the yield is roughly estimated at 1,000 bales.

Exports advanced from 2,000,000 bales in 1912-13 to approximately 3,000,000 bales in 1913-14, which represented 33.5 per cent of the value of the exports of raw materials, and 17 per cent of the total exports from British India. A great deal of interest is taken in the development of Indian cotton growing; the International Federation Association has again reported favorable possibilities in the Province of Sind, although the absence of a complete system of irrigation is against it. The consumption of Indian cotton in the mills of India is estimated at 6,449,000 hundredweight of 112 pounds, and outside the mills at 450,000 bales of 400 pounds each. Japan retained first place among the countries importing Indian cotton, shipments thence during the year under review amounting to 1,348,000 bales; Germany came second with 348,000; and Belgium and Italy followed.

PACKING AND EXPORT OF INDIAN COTTON.

[By Consul José de Olivares, Madras.]

Indian cotton is put up for shipment to foreign countries in gunny-covered pressed bales, bound with steel hoops. The same method of packing is preferred by Indian mills for cotton used in this country. The usual weight of bales is 400 pounds net, but there is a tendency to increase the size to bales of 500 pounds net. The size for end-pressed

bales is about 2 feet 10 inches by 1 foot 6 inches by 1 foot 6 inches, and the size for side-pressed bales is about 4 feet 1 inch by 1 foot 6 inches by 1 foot 5 inches. The density of pressing varies, according to the age and capacity of the press, from 45 to 65 pounds per cubic foot, the more modern presses giving the greater compression.

Cotton experts in southern India have voiced the opinion that the hard-pressed Indian bales have the advantage over the comparatively loose and unsatisfactory packing that characterizes the American bales of lower sea freight; lower fire insurance (rates in India being more favorable to power-pressed bales of over 40 pounds to the cubic foot as against cotton more loosely packed; less storage space; lower railway freight charged by Indian railways on bales pressed to over 30 pounds per cubic foot; the comparative ease of handling a compact bale of 400 pounds by Indian labor, which is not so strong as that in Europe and America; and finally, the reduction in the risk of loss in weight in transit, particularly where transshipments are involved. The risk always occasions anxiety when Indian mills import cotton from America. Indigenous Indian cotton, as compared with American varieties, is coarse, and the average length of staple is one-fourth inch shorter than that of the American product.

Prior to the war the total annual export of Indian cotton was approximately 2,150,000 bales, which was distributed in about the following proportions: Japan, 1,000,000 bales; Germany, 300,000; Italy, 300,000; Austria, 200,000; Great Britain, 100,000; France, 100,000; and Spain, Sweden, Belgium, and Holland about 150,000 bales between them. The future exportation of cotton from India will be materially affected by the war as to both volume and distribution. While the war lasts shipments will necessarily be reduced through lack of adequate carrying facilities, and the share that formerly went to Germany and Austria will, it is thought, be diverted to other countries, notably to Japan.

TOBACCO.

Tobacco is grown here and there all over the country, chiefly, however, in Bengal, Behar, Bombay, Madras, and Burma. Of two varieties cultivated *Nicotiana tabacum* is by far the most common. Maximum crops are obtained on deep and moist alluvium soils, and a high standard of cultivation, including liberal manuring, is necessary. The crop is suited only to small holdings where labor is plentiful, as the attention necessary for its proper cultivation is very great. The seed is germinated in seed beds and the young plants are transplanted when a few inches high, care being taken to shield them from the sun. The crop is carefully weeded and hoed. It is topped after attaining a height of, say, 2 feet, and all suckers are removed. The crop ripens from February onward and is cut just before the leaves become brittle. By varying the degree of fermentation of the leaves different qualities of tobacco are obtained. A black tobacco is required for hooka smoking, and this is the most common product, but a certain amount of yellow leaf is grown for cigar making.

Although the imports of tobacco into India exceeded the exports, owing mainly to heavy purchases of cheap cigarettes from the United Kingdom, the export trade is of increasing importance. The total export of tobacco of all descriptions in 1913-14 amounted in value

to 48 lakhs of rupees (\$1,557,280). The area under tobacco in British India is represented to be 964,726 acres. Indian tobacco has found a good market on account of the higher prices attained by other tobaccos in recent years. This induced larger exports to France, which ordinarily depends on Java for its supply. The United Kingdom and Holland also increased their requirements.

[By Consul E. H. Dennison, Bombay.]

The British-American Tobacco Co. practically controls the tobacco import trade in India. The few local independent manufacturers find it difficult to keep their businesses going with such strong opposition. There is a large import of cigarettes solely under its control. It has a factory at Mongir, in Bengal, and has purchased land upon which it grows its own tobacco.

The manufacture of tobacco is a promising industry in India. The natives smoke from early youth, and the tendency is toward the abandonment of the clumsy hooka in favor of cigars and cigarettes. The bulk of the leaf is exported to foreign countries in a crudely cured condition, or is sent to Burma to be mixed with locally grown tobacco and made into cigars.

IMPORTED CIGARETTES CHEAP.

The prevalence of cigarette smoking is very noticeable in Bombay and other large towns. The cigarettes are sold at a price that brings them within the reach of all and creates a demand, for in the case of articles of popular consumption cheapness is in India the first consideration. However, in spite of these large importations, the Indian cigarette, locally known as "biri," more than holds its own, except perhaps in the seaport towns where no inland freight has been paid upon the imported article. The cheapness of the biri is amazing, a thousand of them being sold for 20 cents and even less, notwithstanding the tobacco for their manufacture is sometimes brought from Madras and Assam, but the wages paid are only a little over half a cent for rolling 100 cigarettes.

The Indian cigar industry is an expanding one and Indian manufactures are now exported to all parts of the world, but the quality of both the Indian cigar and Burma cheroot is quite variable, due to the uneven quality of the tobacco. The Government has made repeated efforts to improve the culture, but owing to the conservatism of the cultivators no success has been attained. The method of curing is also crude. The process is not under control and is frequently carried too far, with the result that the aromatic properties are dissipated and an objectional pungent mass is left.

For wrappers the Indian cigar manufacturers employ imported leaf, which may either be Sumatra or Java, and for fillers native-grown tobaccos are used.

TEA AND COFFEE.

Tea cultivation in India is centered chiefly in Assam, Bengal, and southern India. The latest available official acreage statistics are those for 1913, and these show a total of 609,700 acres under tea, or nearly 3 per cent more than in 1912. Of this area 556,100 acres were plucked in 1913. There were 285 tea gardens in Bengal, 732 in

Assam, and 259 in southern India. Of the year's total production of 307,097,000 pounds of tea, Assam contributed 199,722,000 pounds, Bengal 80,109,000, Bihar and Orissa 22,245,000, northern India 4,709,000, and southern India 312,000 pounds.

India is the world's largest shipper of tea, its exports (by sea) in 1913-14 exceeding those of China by more than 100,000,000 pounds and those of Ceylon by an equal amount. The year was, in fact, a record one, shipments by sea totaling 289,518,833 pounds, against 281,815,329 in 1912. The chief consuming countries for Indian tea are the United Kingdom, Russia, Canada, China, Australasia, Ceylon, Asiatic Turkey, and the United States.

[By Consul General James A. Smith, Calcutta.]

The tea season of 1914-15 is thus reviewed by a prominent Calcutta firm of tea merchants:

Season 1914-15 has closed with an actual crop as represented by shipments through Calcutta and Chittagong of 285,000,000 pounds, of which 224,000,000 have been shipped to the United Kingdom. Last year the corresponding figures were 272,500,000 and 196,500,000, respectively. Shipments through the port of Chittagong have amounted to 48,000,000 pounds, or 8,000,000 less than last season; this considerable decrease is almost entirely due to shortage of freight, only three steamers clearing during September and October, with the result that several concerns diverted their produce to Calcutta for shipment. The crop as regards quality must, speaking generally, despite the excellent results shown in Cachar and Sylhet and in the later manufacture in Assam, be described as distinctly mediocre and would seem to emphasize the fact that increased yields can be obtained only at the expense of cup.

LIMITED PRODUCTION OF COFFEE.

The Indian coffee industry continues to be injured seriously by the large supplies of low-priced Brazilian coffee that are now thrown on the market. Coffee is produced only in Mysore, Coorg, and Travancore, and in the Wynnaad, Nilgiri, and Shivaroy hills of Madras. It is exported almost entirely from the Madras ports. The area under cultivation during the season ended June 30, 1913, was estimated at 91,913 acres in British India and 105,875 acres in Mysore, a total of 197,788 acres, with a production of 200,000 bags of 132 pounds each. The estimated yield for 1913-14 was 125,000 bags, and during that year 259,900 hundredweight of 112 pounds were exported.

IMPORTANT OILSEED CROPS.

The crops classified under oilseeds are chiefly sesame, linseed, and the cruciferous oilseeds (rape, mustard, etc.). Although oilseeds are subject to great fluctuation in price and the crops themselves are more or less precarious by nature, they cover an immense area.

Linseed requires a deep and moist soil, and is thus grown chiefly in Bengal, Behar, the United Provinces, and the Central Provinces. The crop is grown for seed and not for fiber, and the common varieties are of a much shorter habit of growth than those of Europe. The yield varies greatly from practically nothing up to 500 or 600 pounds of seed per acre. The seed is mainly exported whole, but a certain amount of oil pressing is done in the country.

Sesame (or gingei) is grown mostly in peninsular India as an autumn or winter crop. The seed is mainly exported.

According to the final and supplementary official memoranda on the sesame crop of the season 1914-15, the total area reported amounts

to 4,463,400 acres, which is 238,800 acres larger than the preceding year. The total estimated yield is 493,200 tons, this being an increase of 131,900 tons over the preceding year. These figures do not include the so-called mixed crop of the United Provinces.

Cruciferous oilseeds form an important group of crops in northern India, where they grow freely and attain a fair state of development. They are one of the most useful crops in the rotation. They occupy the land for a few months only, and owing to their dense growth leave the soil clean and in good condition after their removal. A number of varieties are grown, differing from each other in habit of growth, time of ripening, and size and quality of seed. The best known are rape, toria, and sarson. The crop is generally sown in September or early October and harvested from December to February. The crop is subject to the attack of aphis (green fly) at the time of flowering, and sometimes suffers considerable damage from this pest. The seed is often injured by rain, and great care has to be taken in the drying. The produce is largely exported whole, but there is a considerable amount of local oil pressing, the cake being in demand for feeding purposes.

According to the second official forecast, the total area under rape and mustard for 1914-15, so far as reported, amounts to 3,860,000 acres (excluding the "mixed" crop of the United Provinces, for which no estimate is at present available). This is 74,000 acres, or 2 per cent, larger than the revised figures on the corresponding date of last year. The detailed figures for the Provinces are:

Provinces.	1913-14	1914-15	Provinces.	1913-14	1914-15
United Provinces (unmixed crop).....	Acres. 94,000	Acres. 145,000	Northwest Frontier Province	Acres. 68,000	Acres. 115,000
Bengal.....	1,335,000	1,325,000	Bombay and Sind ^a	b 434,000	308,000
Punjab.....	825,000	978,000	Hyderabad.....	6,000	7,000
Bihar and Orissa.....	725,000	677,000	Total.....	3,786,000	3,860,000
Assam.....	b 929,000	305,000			

^a Including Native States.

^b Revised figure.

The total area under linseed, so far as reported, amounts to 2,562,000 acres (excluding the "mixed" crop of the United Provinces, for which no estimate is at present available). This is 162,000 acres, or 6 per cent, less than the area on the corresponding date of last year. It may be noted that since 1911 the price of linseed has fallen considerably in world markets. There has been a marked fall in January, 1915, as compared with the prices of earlier years, although later prices in London show a tendency to rise. The demand for Continental countries has been considerably curtailed owing to the outbreak of war. The detailed figures for the Provinces are:

Provinces.	1913-14	1914-15	Provinces.	1913-14	1914-15
Central Provinces and Berar.					
United Provinces (unmixed crop).....	Acres. 1,057,000	Acres. 1,162,000	Bombay ^a	Acres. 127,000	Acres. 117,000
Bihar and Orissa.....	247,000	202,000	Punjab.....	39,000	39,000
Bengal.....	646,000	619,000	Hyderabad.....	412,000	234,000
Total.....	196,000	189,000	Total.....	2,724,000	2,562,000

^a Including Native States.

In 1913-14 Bombay did the largest business in oilseeds, exporting nearly 50 per cent of the total trade; Madras came next with 16 per cent; and Sind and Bengal followed with about 14 per cent each. Practically all the oilseeds exported were sent to Europe; the quantity was the largest on record, but prices for linseed, cotton seed, and peanuts (groundnuts) were low, and the aggregate value of the trade was much less than in the record year 1911-12. The reported yield of the different oil seeds was as follows: Rape and mustard seed, pure, 715,900 tons, mixed, 327,000 tons; linseed, pure, 323,200 tons, mixed, 59,000 tons; sesame, pure, 365,900 tons, mixed, 42,000 tons; and peanuts, 731,900 tons.

The linseed consumed in India represents a very small proportion of the production, it being grown exclusively for export. Linseed cultivation covers an area of 4,000,000 acres. The exports of rapeseed, which is grown extensively in the Punjab for export, were somewhat in excess of those of the preceding year, being 4,980,000 hundredweight of 112 pounds, as against 4,356,589 hundredweight during 1912-13. The largest buyers of rapeseed were Belgium, Germany, and France. Sesame is largely consumed in India, and a shortage in it or in rapeseed curtails its exportation. The oil extracted from this seed is chiefly used in making soap.

The traffic in cotton seed was due to the sudden development of a foreign demand, mainly in the United Kingdom. The exports of cotton seed in 1910-11 reached the record figure of 5,980,226 hundredweight of 112 pounds. In 1913-14 they amounted to 5,686,533 hundredweight, and were considerably in excess of 1912-13. Cotton seed was mainly, if not entirely, shipped to the United Kingdom, which had previously been supplied from Egypt. The exports of castor seed rose from 2,212,611 hundredweight to 2,697,754 hundredweight, the principal importing countries being the United Kingdom, France, and the United States. Thirty or forty years ago Europeans and the wealthier Indians employed castor-seed oil for house illumination. Now it is used chiefly as a lubricant for machinery and as a preservative for leather goods.

COPRA (DRIED COCONUT KERNEL).

The trade in copra is greatly expanding. Copra is shipped from the west coast of the Madras Presidency, especially Cochin and Calicut, to the Continent of Europe. Exports in 1913-14 amounted to 763,832 hundredweight of 112 pounds each. Formerly the article was chiefly used in the manufacture of soap, but its value has improved since its use in the manufacture of nut butter was recognized. Shipments to Germany and the United Kingdom fell off slightly, but Belgium, France, and Russia increased their share.

MILLET AND PULSE.

Millets constitute one of the most important groups of crops in the country, supplying food for the poorer classes and fodder for the cattle. The varieties vary greatly in quality, height, and suitability to various climatic and soil conditions. Perhaps the two best known varieties are jowar, tall growing, with a large open head,

and bajra, with a close rat-tail head and thin stem. Generally speaking, the jowars require better land than the bajras and the distribution of the two crops follows the quality of the soil. Neither for jowar nor for bajra is manure applied and cultivation is not so thorough as for wheat, the main objective being to produce a fine seed bed. As the crop is generally sown in the beginning of the monsoon it requires to be thoroughly weeded. It is often grown mixed with the summer pulses and other crops, in which case thin seedlings are resorted to. The subsidiary crops are harvested as they ripen, either before the millet is harvested or afterwards. The produce is consumed in the country.

Pulses are commonly grown throughout India and the grain forms one of the chief foods of the people. Most kinds do well but are subject to failure or shortage of yield owing to a variety of circumstances, among which rain at the time of flowering appears to be one of the most important. They are therefore more suitable to grow as mixed crops, especially with cereals, and are generally grown as such. Being deep rooted and practically independent of a nitrogen supply in the soil they withstand drought and form a good alternation in a cereal rotation. The chief crops under this heading are gram, mash, mung, and moth, gram forming the main winter pulse crop while the others are grown in the summer. The pulses grow best on land that has had a good deep cultivation. A fine seed bed is not necessary. For gram especially, the soil should be loose and well aerated. Indian pulses are not largely exported although they are used to some extent in Europe as food for dairy cows.

OPIUM.

The area under opium in India in 1913-14 was 145,000 acres, and the exports were 4,906 chests, the trade being considerably curtailed on account of agreements made with the Chinese Government in 1907 and 1911 for the curtailed exportation of Indian opium to China. The principal areas in which the poppy is grown are certain districts in the United Provinces, the product being known as Bengal opium; and in a number of Native States in central India, the product being called Malwa opium, on which a pass duty is levied when it enters British territory for export from India. The Government of India fixes the amount to be exported.

RUBBER.

[By Consul General James A. Smith, Calcutta.]

A recent issue of the Indian Trade Journal gives some interesting information relative to rubber cultivation in India. The production is confined to Assam, Burma, and the Madras Presidency. Export figures show that from these three centers there were shipped in the fiscal years ended March 31, 1913 and 1914, 14,627 hundredweight and 23,264 hundredweight, respectively (hundredweight = 112 pounds), distributed as follows: In 1912-13, Assam 1,041, Madras 8,888, and Burma 4,698; in 1913-14, Assam 474, Madras 15,959, and Burma 6,831.

The yield of the Assam plantations is relatively small and the number of trees to the acre much less than in Madras and Burma. Although Burma easily heads the list in acreage and number of trees planted, most of these trees, being less than 6 years old, are not at present productive. It is not surprising, therefore, to find that the outturn of Madras, as indicated by the export figures, is at present more than double that of Burma. Burma has an acreage of 29,544 acres given over to rubber cultivation, and the number of trees planted is reported as 4,911,399. Madras has 12,022 acres and 1,636,476 trees, and Assam has 4,681 acres and 137,430 trees.

The quality of south Indian rubber improved considerably and compared favorably with that of Ceylon and the Malay States, but prices were much below those prevailing in the preceding year. In Burma attention is being paid to the economical management of the industry, as well as improving the methods of placing rubber on the market. Shipments were made principally to the United Kingdom and Ceylon.

GROUNDNUTS.

The total area devoted to groundnuts in the season 1914-15 is estimated as 1,995,000 acres, as compared with 2,106,000 acres (revised figures) for 1913-14, or a decrease of 5 per cent. The decrease in area is mainly in the Carnatic and Central districts of the Madras Presidency and in the districts of Satara and Belgaum in the Bombay Presidency, and is attributed to unfavorable weather conditions at sowing time in these tracts. Conditions after sowing proved generally fair for the growth of the crop. The total yield is estimated at 929,000 tons of nuts in shell, as against 749,000 tons (revised figures) for last year, or an increase of 24 per cent. Details for the Provinces are given below:

Provinces.	1913-14		1914-15	
	Acres.	Tons.	Acres.	Tons.
Madras.....	1,605,000	411,000	1,485,000	580,000
Bombay (including Native States).....	254,000	250,000	243,000	247,000
Burma.....	247,000	88,000	267,000	102,000
Total.....	2,106,000	749,000	1,995,000	929,000

ACREAGE OF CROPS, 1914-15.

[Indian Trade Journal, Mar. 11, 1915.]

The following table shows the Indian Statistics Department's second forecast of the acreage of nine leading crops of India for the season of 1914-15, together with the Provinces to which the figures relate, the percentage of the total average crop represented by the Provinces mentioned, and the percentage of increase or decrease in the reported area as compared with the annual average for the same tracts at the corresponding date:

Crop.	Tracts comprised in the figures.	Per cent of average. ¹	Acres.	Increase or decrease.
Cotton.....	All cotton-growing tracts.....	100.0	24,030,000	<i>Per cent.</i>
Sesame.....	United Provinces, ² Madras, Central Provinces and Berar, Bombay and Sind, ³ Bengal, Behar and Orissa, Punjab, Ajmer-Merwara, and Hyderabad.	79.0	5,389,000	+12.0 +12.0
Indigo.....	Behar and Orissa, Madras, Punjab, United Provinces, Bombay and Sind, ⁴ and Bengal.	100.0	131,700	-46.0
Rice.....	Bengal, Madras, Behar and Orissa, Burma, United Provinces, Bombay and Sind, ⁵ Central Provinces and Berar, and Assam.	98.9	75,162,000	- .1
Peanuts.....	Madras, Bombay, ⁶ and Burma.....		1,995,000	+60.0
Sugar cane.....	United Provinces, Punjab, Behar and Orissa, Bengal, Madras, Bombay and Sind, ³ Assam, Northwest Frontier Province, and Central Provinces and Berar.	99.4	2,315,000	- 1.0
Wheat.....	Punjab, ⁷ United Provinces, Central Provinces and Berar, ⁸ Bombay ⁹ and Sind, Behar and Orissa, Northwest Frontier Province, Bengal, Ajmer-Merwara, Central India, Rajputana, Hyderabad, and Mysore.	99.8	32,028,000	+13.0
Rape and mustard.....	United Provinces, ² Bengal, Punjab, Behar and Orissa, Assam, Northwest Frontier Province, Bombay and Sind, ⁴ and Hyderabad.	99.2	3,786,200	+13.0
Linseed.....	Central Provinces and Berar, United Provinces, ² Behar and Orissa, Bengal, Bombay, ⁸ Punjab, and Hyderabad.	99.0	2,458,800	-22.0

¹ Calculated on the total acreage in all India in the case of cotton and on that in British India in the case of other crops.

² Unmixed crop.

³ Includes Native States.

MARKET FOR AMERICAN SEEDS.

There are two distinct seasons in India for the growth of flowers and vegetables peculiar to each—the rainy season and the cold season. The seeds for the rainy season are sown in June, and those for the cold weather in October. Generally the supply from Europe for both these seasons is obtained in one lot in April or May where the climatic conditions—such as those at Poona, Bangalore, and places in Upper India—allow of seeds for the cold season being kept without deterioration for sowing in October. In Bombay the hot and moist weather in the rainy season soon affects the seeds, and they lose their germinating power to a great extent. Hence the supply in Bombay has to be obtained in two lots, one in May for the rainy season and the other in October for the cold season.

FARM-IMPLEMENT TRADE.

FARM-IMPLEMENT DEPOTS.

In connection with the agricultural development of India, there is tremendous opening for the introduction and sale of agricultural machinery and implements. The chief difficulties are the general ignorance of the people concerning mechanical appliances, their traditional conservatism concerning improvements that would save labor, which in most parts of the Empire is very cheap and plentiful, and also the need of widespread assistance to finance beneficial purchases, and finally, the need for suitably instructing farmers how to make proper and profitable use of such machinery and implements when purchased.

On account of the peculiar and primitive conditions prevalent in India, the governments of different Provinces, in order to foster agricultural development and promote the use of machinery and appliances for accomplishing results far superior to those now obtained, have found it necessary to adopt paternalistic policies that would seem strange and quite unnecessary in countries in a higher state of education, prosperity, and general advancement.

PATERNALISM AND PRIVATE FIRMS.

Such paternalistic policies are well exemplified in the farm-implement depots, which are now well established and doing a most useful work in many Provinces in India. At these Government depots it is the practice to make a study of implements most suitable to local conditions, to import or manufacture them for sale to farmers, and after they are sold, continually to guide and instruct the farmers in their proper use. Such Government implement depots have met with much complaint from private firms, which have resented such governmental competition in the sale of implements to farmers. However, their operations have assisted greatly to increase importations into India of up-to-date agricultural machinery and appliances, and through their campaign of education they have opened up and successfully prepared the way for extensive business in the sale of such articles in large sections of the Empire where previously no business of such sort was possible.

It seems to be the official intention in those Provinces where farm-implement depots are now established eventually to abandon them as soon as their acute need no longer exists and then to leave the commercial field to private enterprise. It is with such purpose that it is usually the policy of these Governments not to sell implements to the farmers at cost, but to allow a margin of profit of about 10 per cent, so that when the field is eventually turned over to private companies, which of course must always have a fair profit, they will not be at a disadvantage in having to charge higher prices than were previously charged by governmental depots.

OPPORTUNITY FOR AMERICAN MANUFACTURERS.

The work of the various State farm-implement depots in India deserves the serious attention of American manufacturers who wish to find a good field in India for the sale of their implements, for it is apparently only possible, at present at least, to gain much success in this market by working in cooperation with these Government depots and securing official approval and patronage of the various implements whose sale here is desired. The officers of these implement depots should be kept in close touch with, and their suggestions and criticism should be earnestly considered, if any great measure of success is to be expected.

At the meeting of the Board of Agriculture in India, held in Pusa in 1910 (this board meets at intervals of every three or four years), there was considerable discussion of the best means of supplying improved implements of agriculture to cultivators, and a great deal of valuable information on the present methods of making use of implement depots and other governmental assistance in the different Provinces was supplied. As the facts brought forth should be of great practical value to farm-implement manufacturers in the United States, typical conditions in different Provinces for selling implements are noted below:

THE PUNJAB, UNITED PROVINCES, AND CENTRAL PROVINCES.

The Agricultural Department in the Punjab receives from the Government a permanent advance of \$1,334 for introducing agricultural implements to cultivators. The implements chiefly introduced are plows, chaff cutters, winnowers, bullock hoes, and reapers. No thrashing machines have so far been purchased. Private firms have now undertaken some of the work. Their share in the business is increasing and is likely to increase. It already amounts to about ten times as much business as the share of the departmental depot. When an order is received at the departmental depot for any implement which a firm can supply and which is not at the moment stocked at the depot, that order is passed on to the firm. It has now come to be a question whether it will be long necessary to maintain the departmental depot. Firms sell only such implements as are approved by the department. At present cultivators usually specify the firms to which they wish their order sent. When the department supplies an implement it charges a small profit of about 10 per cent over and above cost and charges. It also arranges for local demonstrations at fairs and other centers. The firm that sells the implements sends out notices in advance advising purchasers of implements to attend for instruction, and the department also notifies where demonstrations are to be held, so that possible purchasers may judge for themselves. One private firm stocks implements to the value of about \$13,334, and last year did a turnover of about \$4,000, mostly in reapers. The department has prepared a statement showing such data (as to power and size of oxen, etc.) as might be of use to makers of agricultural implements for India.

The department in the United Provinces has a permanent advance of \$9,334 for seed and implements. Over \$8,334 is devoted to the purchase, holding, and distribution of implements. Some are made wholly or in part in India. Implements bought by cultivators pass through the hands of the agricultural engineer and are distributed through depots and deputy collectors. There are depots at Cawnpore and Partabgarh. Payment is made by the cultivator direct to the department. Demonstrations are held at local fairs and are announced in advance by the authority arranging the fair. The principal implements sold by the department are low-lift chain pumps, plows, chaff cutters, grain crushers, harrows, and cultivators. The department sells at a small profit, and without including interest, insurance, and storage charges. It gives no credit and confines itself to business for cash and on the hire system.

In the Central Provinces so far no private firm has appeared to assist the department. The department stocks winnowers, plows, chain pumps, sugar-cane mills, maize shellers, and bullock gears. Chaff cutters also are stocked, but as yet there has been little demand for them. Small iron sugar-cane mills are, however, in some demand. Winnowers have sprung into great demand within the last two years. A winnower on

the same principle as the American machines, but adapted to suit local conditions, is manufactured by the Rasulia workshops, Hoshangabad. With regard to the price, winnowers are sold at a price for which it pays the local producers to manufacture. Imported machines are sold at cost price plus railway freight, and as the machines are only ordered in small lots the discount is slight. No system of payment by installment is allowed, but cultivators can apply to the district officers for a loan for the purchase of improved machines and implements, and a list of improved machines and implements is sent by the deputy director of agriculture, Northern Circle, to all deputy commissioners in his circle for note and guidance.

BOMBAY PRESIDENCY, BENGAL, AND MADRAS PRESIDENCY.

There are three agencies in the Bombay Presidency for the demonstration and distribution of implements: (1) Agricultural Department, (2) firms, (3) the more advanced agricultural associations. The department cooperates with the two latter. The department takes charge of machines belonging to firms and sells them without making any charge for agency. No liability is accepted by the department for the state of implements in their charge. The department is at present prepared to act as subagent for any firm that cares to enter into business. The chief descriptions of implements distributed are plows, chain pumps, chaff cutters, and iron cane mills. In Sind there is a workshop at Mirpurkhas making plows, thrashing machines (Egyptian pattern), water-lifting apparatus, and leveling scrapers. This workshop made about 500 plows in 18 months. The farms act as depots. The terms are cash; credit is not usually given by the department, but \$1,667 is provided for loans to enable cultivators to purchase implements. Demonstrations are held at fairs or when any other opportunity presents itself, and implements are sometimes lent to cultivators for trial. It may be said that there are two or three demonstrations every month excepting during the rains; and when cultivators come in to buy seed the opportunity is taken to hold additional demonstrations. An itinerant demonstrator accompanies the revenue officers or irrigation officers and explains the use of implements in particular districts, as, for instance, thrashers in the Tapti Valley. More orders are received by the department than it can execute. A native firm in Belgaum has entered the trade and sells about 200 plows a year. The department itself probably sells about 100. Imported implements are sometimes bought through a firm in India and sometimes direct from the manufacturers. The department charges bare cost price, but when it receives an order that could be executed by the firm, it passes it on to that firm.

In Bengal there is one central depot for seed and manures. Orders were formerly executed by this depot, but at present they are too numerous to be dealt with departmentally. A firm in Calcutta has undertaken the manufacture of plows, which form the mainstay of the business. Other firms are ready to enter in competition. No system of inspection by the department before delivery of implements by firms to purchasers has been arranged. The principal implements distributed by the department are plows, water-lifting appliances, sugar-cane mills, evaporating pans, chaff cutters, and maize hullers. The value of the stock held is not great. Experimental farms act to some extent as depots, but the implements there held are used only for show and demonstration work and are not sold. No duplicates are stocked. Orders received at the farms are passed on to the firms. Demonstrations are held chiefly at fairs, but also at farms in connection with meetings of divisional agriculture associations.

Work in the Madras Presidency has been wholly confined to supplying implements of local manufacture. The method can be summed up in a few words. Lend implements free, give advice and instruction free, teach farmers how to handle these implements until they realize that it pays them to use them.

EASTERN BENGAL AND ASSAM.

The department receives occasional applications for advice regarding sugar mills and in these cases the applicants are referred to firms which deal in them. On the Shillong farm a small number of spraying pumps and grafting and pruning tools are stocked for sale or hire to cultivators. Beyond this nothing has been done toward supplying improved agricultural implements and machinery, except that attempts are being made to bring certain implements to the notice of cultivators by means of demonstrations at agricultural shows, and also by means of leaflets. The implements specially recommended are: Hindustan plows, Planet Junior hoes, three-roller iron sugar mills, shallow boiling pans, spraying pumps (chiefly for spraying potatoes in the Khasi Hills), grafting and pruning tools.

PRIVATE AND COOPERATIVE RETAILING.

The Board of Agriculture of India at its meeting in 1910 recommended as a general line of policy to be followed in the future that implement depots should charge such profits as will leave a margin, after allowing for freight, interest, insurance, depreciation, and storage, to any private firms that might elect to enter the business, and that the supplying of implements should not be regarded as a permanent Government function. It was recognized that at present the agricultural departments in most of the provinces should be prepared to stock implements, but that every effort should be made to get firms to enter the business and take over that part relating to central depots and the holding of stocks.

Moreover cooperative societies and agricultural associations should be induced to undertake the duty of local retailers, the departments, however, remaining an intermediary to some extent between these associations which collect orders and the firms which execute them; moreover departmental officers should not accept and transmit orders other than those of types approved by their departments. Every local department was requested to prepare statements of data likely to be of use to the manufacturers of mechanical implements suitable for the particular tract concerned.

Concerning farm implement depots in India, a complete list of chief officials with whom American implement makers may correspond is as follows:

PROVINCES OF INDIA.

- Director of Agriculture, Madras, Madras.
- Director of Agriculture and Cooperative Credit Societies, Bombay, Poona, Bombay.
- Director of Land Records and Agriculture, United Provinces, Allahabad.
- Director of Agriculture, Bengal, Calcutta.
- Director of Agriculture and Industries, Punjab, Lahore.
- Director of Agriculture, Burma, Mandalay.
- Director of Agriculture, Behar and Orissa, Ranchi.
- Director of Agriculture and Industries, Central Provinces and Berar, Nagpur.
- Director of Land Records and Agriculture, Assam, Shillong.

IMPORTANT NATIVE STATES.

- Director of Agriculture, Bangalore, Mysore.
- Director of Agriculture, Hyderabad, Hyderabad.
- Director of Agriculture, Gwalior, Gwalior.
- Director of Agriculture, Baroda, Baroda.
- Director of Agriculture, Srinagar, Kashmir.

CHIEF FARM IMPLEMENTS.

The following are the chief farm implements in India:

PLOWS.

The plow is the principal instrument and is in many parts of India practically the only one used for preparatory tillage. There are many kinds, varying in weight and effectiveness, but the general pattern is the same for all. The part that penetrates the soil is a wedge-shaped block of hardwood. The draft pole projects in front, and to it is attached the neck yoke of the bullocks, while a short single upright stilt behind serves as a guiding handle. The point of the wedge (to which an iron share is usually attached) loosens the soil to a depth which varies with circumstances, while the body of the wedge moves the loosened soil but does not invert it. In moist soil the plow works like a single-tined grubber. If the plow is light the tillage is superficial, and

the ground has to be gone over many times before the desired tilth is obtained. All Indian plows, however, are not light. There are many patterns, intermediate in weight and effectiveness, between the small plow which the Bengal cultivator carries afield on his shoulders, and the cumbrous implement, to which four or six pairs of oxen are yoked. The latter is used in the fair season to break up black soil into huge clods, and penetrates usually 10 or 12 inches. Thousands of iron turn-furrow plows have replaced these heavy indigenous plows in the black soil plains of Madras, and some also are in use in Bombay and the Central Provinces, but where light plowing is sufficient the cost of iron plows militates against their adoption. In the alluvium of northern India a light plow with an iron soil-inverting moldboard, drawn by draft pole and neck yoke, has been found useful. The statement that an Indian plow merely scratches the surface is correct only as regards some tracts. Over the greater part of India a light plow is used for sowing seed. A bamboo seed tube is attached to it, and the seed is dropped by hand through this tube as the plow works. The seed falls into the shallow furrow and is covered by the soil moved in making the next furrow. The seedlings do not come up in accurately straight rows and some hindrance results to interculture, especially where the spacing of the crops would make it possible to use a bullock hoe.

SCARIFIERS.

The scarifier is unknown in northern India, but is extensively used throughout the Deccan trap tract. The part which does effective work in loosening the surface soil and eradicating weeds is an iron blade of varying length and shape. It is usually 3 feet or less in length and 2½ to 4 inches wide, with the cutting edge sharper than the other. The blade is fixed by two wooden or iron stays to a horizontal beam which forms the headpiece of the scarifier. To complete the implement a draft pole and neck yoke are required, with a stilt or handle to guide it. The scarifier is used extensively during the hot weather as a substitute for the plow, and also follows the plow to prepare the seed bed. When at work the wooden headpiece passes over the surface and acts as a very effective clod crusher, while the blade, working below the surface, loosens 2 or 3 inches of soil and raises weeds to the top. A heavy scarifier, drawn usually by four bullocks, is used with great advantage on black cotton soil in the hot weather. The soil cracks under the influence of the burning sun, and an inch or two of the surface also becomes friable. The scarifier loosens a little of the underlying hard layer and through its action a good deal of the friable surface soil filters into the gaping cracks, so that every year a fresh layer is exposed for the reception of seed. A light scarifier is generally used after the seed drill to cover the seed and level the surface.

SEED DRILLS.

Seed drills are used in the same tracts as the scarifier. They have a stout wooden headpiece which, like that of the scarifier, gives support and attachment to all other parts; and the pole, yoke, and guiding handle are secured in exactly the same way. Coulters are set obliquely at varying distances in the headpiece. A hole is drilled in each coulter, into which a bamboo tube is inserted. These tubes as they rise incline toward each other and meet about 3 feet from the ground to support the seed bowl. Each tube communicates with a perforation in the seed bowl, and bowl and seed tubes are supported by ropes. The seed is fed by hand into the bowl. Two men are usually required for this implement, one to guide the bullocks and the other to sow the seed. At work, the coulters cut furrows into which the seed drops before the soil falls back, the covering being completed by a light scarifier. In sowing mixed crops the seed is either mixed in proper proportion before sowing or that of the subordinate crop is sown through a separate seed tube, attached to the drill by means of a rope and guided along the track by one of the coulters.

BULLOCK HOES.

The use of a seed drill economizes seed and saves much hand labor in weeding. Where the spaces between the drills are wide, it also permits the use of bullock hoes, which are constructed in precisely the same manner as the scarifier, but on a miniature pattern, the blades being from 7 to 15 inches in length, according to the distance between the rows of crop for which they are intended. Bullock hoes are worked in pairs, drawn by one pair of bullocks, but each implement is guided by a man. The blade of each hoe cuts weeds and stirs the surface soil between the rows of growing crop, these beneficial operations being repeatedly and expeditiously performed at little cost.

HARROWS.

A three or four coultered seed drill, with the seed bowl and seed tubes removed, is sometimes worked like a light grubber or harrow; and a similarly constructed implement, with the tines closer together, is used as a harrow in the Madras and Bombay Presidencies. The hard wooden tines are a foot or less in length and are sometimes, but not always, tipped with iron. Levelers and clod crushers are used to smooth the surface before sowing, and also to conserve moisture. They consist in many cases of a rectangular beam of wood drawn by one or more pairs of bullocks; in Bihar the beam is sometimes hollowed so as to give two sharp edges. The plank is drawn by a pair of bullocks, and the driver stands upon it to increase its effective power.

AGRICULTURAL IMPLEMENTS IN THE PUNJAB.

The Punjab Province in northern India offers probably the best market in India for agricultural implements, especially plows, hoes, wheat-reaping machines, winnowing machines, and chaff cutters. This Province produces much more wheat than any other in India; as it also contains the greatest amount of irrigated land, there is greater certainty of satisfactory harvests.

Over 3,000,000 acres of rich but previously unwatered land in the Punjab have been opened up to wheat cultivation by irrigation within the last eight years, and 2,000,000 acres more are being turned into wheat farms as the result of great new irrigation projects. Not only has there been a large increase in cultivated areas, with a promise of further large increase, but also the ordinary labor supply—never abundant—has been diminished by the ravages of plague and malaria and the ever-increasing demands of the Irrigation Department for new works. Since the plague started, about 11 years ago, it has caused the death of about a million people in the Punjab. It is thus easy to understand that there is more inducement to use labor-saving machinery here than in other Provinces where the labor supply is still rather overplentiful.

In the total acreage devoted to food grains and pulses, the Punjab with 22,029,984 acres in 1911 ranked next to Bengal, Madras, and the United Provinces in the order named (Bengal, 36,989,500 acres; Madras, 30,191,986 acres; and the United Provinces, 27,777,049 acres). In acres devoted to wheat the Punjab ranked first, having 8,884,697 acres in 1911, the United Provinces coming next with 7,405,794 acres, and the Central Provinces with 3,231,798 acres.

PREPARING THE SEED BED—DRILLING METHODS.

The preparation of soil for the wheat crop differs in the Punjab according to the amount of monsoon rain and method of irrigation. On lands which are flooded by inundation canals the soil is plowed once or twice when dry enough and leveled with the "sohaga," which is a heavy squared beam drawn by one or two pairs of bullocks, the drivers of which stand on the beam. This is partly to break the clods, partly to pulverize the soil, and partly to consolidate the surface to retain the soil moisture. The object of the cultivator on such soils is to prepare a seed bed and at the same time to lose as little of the moisture as possible. Land irrigated from wells is generally plowed much more frequently during the monsoon—sometimes as many as 14 times by industrious cultivators. In this way the soil is aerated and all the rainfall absorbed. On the canal colonies the preliminary preparation is much less, as the soil is too hard to plow during the hot

season without preliminary watering. In August and September the land is flooded and plowed once or twice and left until November, when it is watered again and replowed previous to sowing.

Wheat is, as a rule, drilled on soils where it is essential that the seed should reach the moisture. If, however, the lands are moist enough, the seed may be broadcasted on the unplowed surface and worked into the land by two cross plowings. A common form of drilling is to drop the seed into a bamboo tube attached to the plow. On "well" lands the seed is, as a rule, broadcasted while in the canal colonies the wheat is more often dropped by hand into the open furrows, the sowers following the plows. This work is generally done by the women and children, while the plows are driven by the men of the family. In one district (Bannu) the seed is said to be drilled 3 or 4 inches deep into the unplowed sandy soil. Except where the seed is drilled, the land, after sowing, is smoothed and the surface is consolidated by the "sohaga." By this means a firm seed bed is obtained and the upper moisture is conserved. The seed rate is usually about 82 pounds an acre, but with late-sown wheat the quantity is about 100 pounds.

FIELD DIVISIONS FOR WATERING—WEED TROUBLES.

The last operation of all on irrigated land, which is carried out before germination takes place, is to divide the land into compartments for greater convenience of watering. Ridges of earth are made by two men with the "jandra" (a large wooden rake). One man holds the handle and another pulls a string attached to the handle at its lower end where it joins the rake. The compartments vary in size according to the surface undulations and are always much smaller in well-irrigated lands than where water is obtained from canals.

As a rule, the wheat crop is not weeded except by the best cultivators on well lands. The most troublesome weed is the onion weed, which is exceedingly common everywhere in the Punjab, and which seeds freely on the banks of the water channels. In the canal colonies another weed, "bathu," is also common in the wheat at harvest time. It is probable that if more care were taken to keep the water channels and waste corners clean, the yearly loss by weeds in the colonies would be much reduced.

HAND HARVESTING—WAGES PAID.

The harvest in the Punjab begins about the middle of April and extends well into May except in the Frontier districts, where it is not over till the end of June. The grain is cut by hand with a sickle, the workers usually squatting on the ground. Large bundles are made, so they may be readily counted and they are usually stacked roughly for thrashing. The extreme dryness of the straw makes this possible and no loss is suffered by the wheat in the bundles heating. Indeed, so dry and brittle is the straw that the straw bands for tying have to be soaked in water to make them tough enough.

The laborers are usually paid in kind, but in the canal colonies, where the area to be reaped is enormous and labor scarce, as much as 32 cents a day is paid (a high rate for India) for hired labor. The scarcity of labor and the large holdings in canal colonies have had a marked effect on the variety of wheat grown. Bearded wheat is

generally grown in preference to beardless, as this kind is less liable to the depredations of birds and sheds its grain less easily, thus suffering less damage if it remains standing in the field.

SIMPLE THRASHING PROCESSES.

The grain is generally trodden out by the feet of cattle, assisted by the thrashing frame. This is a hurdle covered with brushwood and weighted with bricks or clods of earth. The bullocks are yoked to the frame and fastened to a post in the center of the thrashing floor of beaten earth. They are driven round and round the stake about which the wheat is heaped and in a short time the brittle straw is broken up into short pieces and the grain is freed from the chaff. One pair of bullocks with the thrashing frame will tread out the produce of an acre in four days. In the hills where stones are available the thrashing floors are carefully paved, but in the plains they are always of earth. The grain is separated from the chaff by being thrown into the air with a pitchfork. The hot winds which prevail at this time carry the dry chaff to a distance while the grain falls back on the thrashing floor.

The winnowing basket is then used to clean the grain so obtained. Its use is almost universal except in Rawalpindi, where a flat spade-like instrument is used. Winnowing is done by low caste workmen, rarely by the cultivators themselves, who, in some cases, would prefer to see their grain destroyed by rain rather than winnow it themselves. The chaff is used for fodder, and is especially valuable when mixed with gram chaff, when it is known as "missa." When grown with gram, the two plants are thrashed together, and the resulting grains are often ground and eaten together. The yield naturally varies according to the season and other conditions, so that an average estimate is difficult. On well lands it is about 820 to 1,150 pounds.

STORING THE GRAIN.

Wheat is stored in the houses of the cultivators as a rule, but the old practice of keeping it in pits is still in vogue in some of the districts. The pits are lined with wheat chaff, but after about a year grain so kept is apt to darken and deteriorate. For household use the grain is kept in large earthen jars. Well-to-do cultivators have granaries of mud or even of brick in some districts. After the monsoon the wheat is sunned and dried as a protection against weevils. A modern elevator for storage of wheat, the first in India, was erected at Lyallpur in the Punjab in 1913.

The general methods of harvesting, thrashing, and winnowing grain in the United Provinces, the Northwest Frontier Province, and the Province of Sind resemble those in vogue in the Punjab, as thus described.

QUERIES BY AN AMERICAN MANUFACTURER.

With special reference to plowing conditions in the Punjab, I submitted to the Punjab Department of Agriculture in Lahore certain questions as to information requested by an American manufacturer of plows, as follows:

- (1) What is the general nature of soil, i. e., clay, sandy, loam, gravelly, or stony?
- (2) Is the land hilly or level?

844 RESOURCES, INDUSTRIES, AND TRADE OF BRITISH INDIA.

- (3) Is the soil dry and hard, or otherwise?
- (4) What kind of crops are now grown?
- (5) How is the ground now worked?
- (6) What kind of animals have they for doing farm work?
- (7) If oxen, how do they hitch them to the load? Are the yokes strapped to the horns or do they draw from the shoulder?
- (8) Are the animals large or small? Give average weight.
- (9) Are they planting any crops that require very deep plowing, say 10 to 12 inches deep, or is it all shallow work, say 4 to 6 inches deep?
- (10) What percentage of area of the country is under cultivation or semicultivation?
- (11) What is the nature of the labor used on the land, and are the farms under supervision of reasonably intelligent men or not?
- (12) What is the average size of farmers' holdings?

These questions were kindly answered as follows by Mr. W. S. Hamilton, Director of Agriculture and Industries of the Punjab:

- (1) The soil is usually a loam, frequently light and sandy. There are blocks of clay, but they form a small proportion.
- (2) The land is generally quite level.
- (3) The soil is dry; except where sandy, it is hard.
- (4) The chief crops are wheat, rape, and gram (*Cicer arietinum*) in the cold weather, and cotton, sugar cane, maize, millets, and pulses in the hot weather.
- (5) The ground is plowed with plows which do not invert the soil, but simply scratch it to a depth of about 4 inches. For wheat and sugar cane the land is plowed many times, always with the same plows. The plows vary in weight and draft in different tracts. A heavy beam of wood is used for breaking the clods and pulverizing and leveling the soil. Weeding and interculture, when practiced, are done by hand.
- (6) All the work is done by bullocks and buffaloes except in a few poor tracts where camels, cows, and even donkeys are used.
- (7) The load is drawn on the humps of the bullocks, over which wooden yokes are placed.
- (8) The bullocks vary greatly in size—length, 42 to 53 inches; height at shoulder, 50 to 64 inches; girth at chest, 60 to 80 inches. The breed called Hissar or Hariana is the most active and docile. A good bullock of this breed weighs 785 to 1,000 pounds. The ordinary bullocks found in a village are much lighter.
- (9) Nearly all of the plowing is shallow. In a few places the soil is worked very deep for sugar cane; but this is hand labor.
- (10) Total area, 57,315,026 acres; cultivated, 28,097,690 acres. Available for cultivation, not yet cultivated, Government forests, 5,390,906 acres; other lands, 12,587,838 acres. A large part of the Government forests will be broken up in the next few years, as canal irrigation is being extended to the waste lands.
- (11) The land is owned and cultivated as a rule by peasant proprietors, who have no knowledge of scientific agriculture, but have a large amount of inherited practical experience. Some castes are very much better cultivators than others. The laborers are usually village menials, who are not hard working nor intelligent.
- (12) The average size of a holding is 12 acres, of which 8 are cultivated. There is great variation from district to district. One pair of bullocks can cultivate 10 to 25 acres a year, according as the land is canal irrigated or dependent on rain. One family usually cultivates the area that can be worked with one or two pairs of bullocks.

RECOMMENDATIONS OF AGRICULTURAL DEPARTMENT.

The Department of Agriculture of the Punjab, in a printed bulletin issued by its agricultural-machinery depot, specially recommends to cultivators in the Punjab improved agricultural implements, as follows (the implements being obtainable at the machinery depot at Lyallpur, the chief center of the largest irrigation colony of the Punjab):

- (1) The Raja wheat-reaping machine. Price, \$85. Obtainable from Volkart Bros., Lyallpur. Recommended for canal tracts and barani land generally where reaping costs over 80 cents per acre and where the surface of the land is not too soft.
- (2) The Raja winnowing machine. Price, \$56. Obtainable from Volkart Bros., Lyallpur. Recommended where labor is moderately scarce and holdings fairly large. Specially useful in districts where the wind is unreliable in May and June, as

by prompt housing the risk of loss from rain and thieves is minimized. (Orders should be sent by Dec. 1.)

(3) Diamond plow. Price, \$8.82. Obtainable from the professor of agriculture, Punjab Agricultural College, Lyallpur, in charge of the agricultural machinery department. Recommended for general utility on irrigated land, land infested with weeds, or places where there is any difficulty in getting land quickly prepared in time for sowing.

(4) The Simplex chaff and fodder cutter with steel legs. Price, \$14.66. Obtainable from Volkart Bros., Lyallpur. Recommended for general utility for large holdings, cattle breeders, horse runs, etc.

(5) Planet Junior hand hoe, single wheeled. Price, \$7.44. Obtainable from the professor of agriculture, Punjab Agricultural College, Lyallpur.

(6) Planet Junior hand hoe, double wheeled. Price, \$11.82. Obtainable as above.

(7) Improved bullock hoe. English make. Price, \$25.30. Obtainable from Volkart Bros., Lyallpur. Has many adjustments: (a) Used as a substitute for the "desi" plow. It does three times the work of the "desi" plow after land has been broken up. (b) Used as a weed eradicator in the field before sowing. (c) Used as a hoe in crops grown in lines. (d) Used as a ridger. This implement is used on large holdings, horse and cattle runs, etc., the initial expenditure being high for small holdings.

REPORT OF DIRECTOR OF AGRICULTURE.

Improvement in English plows designed for use in northern India, is explained by the Deputy Director of Agriculture of the Punjab in his report for 1912 as follows, who also in this report makes some interesting remarks concerning bullock hoes, steam thrashing and reaping machines:

Improvements have been effected in the Meston type of plow by Ransomes, Sims & Jeffries, consequent upon the visit of the representative to this country last year. The improved Meston plow has given general satisfaction wherever it has been worked; it is also cheap (about \$2.80), and of lighter draft than the "desi" plow. Ransomes have also designed a new plow especially for the Punjab, something after the "Raja" type. This has shown itself satisfactory for certain classes of work. The department is therefore now in possession of both cheap and suitable plows. The two new Ransomes plows will undoubtedly become popular for light work, as they are cheap; the Raja and Punjab types, however, will continue to be required for heavier work. A heavier type of plow for deep cultivation and capable of tackling stiff land is under trial, and promises to prove suitable for reclaiming land infested with dub and other grasses.

Our experience this year has shown the great importance of paying attention to the after cultivation of crops as well as to the preparation of the land before sowing. It is the recognized custom to hand hoe valuable crops, such as sugar cane, but the cotton, and in many places the wheat, crop remain practically untouched from sowing to harvest time. An effort has therefore been made this year to see what can be done in this direction. A flexible chain harrow has been tried on wheat, and has given most promising results. Its use will be demonstrated extensively next year. Two harrows especially designed for use on the sugar-cane crop have been obtained, but unfortunately did not arrive in time for a trial on this year's crop.

In view of the fact that intercultivating implements are practically unknown, an effort was this year made in the Lyallpur colony to demonstrate the sowing of cotton in lines, so as to allow of after cultivation between the rows. Owing, however, to the failure of the cotton crop this demonstration attracted little attention. The work will be continued next year.

Bullock hoes, suitable for cultivating between the rows of cotton and maize crops, have been introduced. Each hoe consists of a small iron blade with a wooden frame and handle. Three of these can be yoked to one pair of bullocks, each hoe being guided by a boy, with one man to drive the bullocks. Such a gang will hoe from 6 to 8 acres a day. The use of these hoes is now being demonstrated on cotton crops in the Lyallpur colony.

A second steam thrasher, with improvements on last year's pattern, was received from Ransomes, Sims & Jeffries, and was used at Lyallpur this season. Particulars of the running of the machine will, however, be withheld until the cold weather, when Ransomes's representative is visiting Lyallpur to carry out trials.

It was thought that little help would be required this year by owners of reaping machines, except in the case of new purchasers. Results, however, have shown that probably for some time to come the department's supervision will be necessary. During harvest time our staff were able to visit 109 machines, out of which number 27 were, for various reasons, not being worked. Some were out of order and had not been sent to the Lyallpur workshop for repairs; others could not be used on account of badly lodged crops; while others, again, were idle owing to trouble with mukhtars (agents) and tenants, who earn more when the crop is hand cut. It was, however, encouraging to see that zamindars (landowners), who work their own land themselves, were all using their machines with success, some cutting as much as 250 and 280 acres during the season.

RIVERS AND CLIMATE.

The Punjab is mostly a vast alluvial plain, covering 133,741 square miles, or nearly equal to North and South Dakota (which together have 148,452 square miles and which produced in 1914, 113,158,000 bushels of wheat from 10,754,000 acres). The Punjab had 9,152,000 acres in wheat in 1914. The word "Punjab" means five rivers—the Indus, Sutlej, Jhelum, Chenal, and Ravi—rising in the Himalayas and flowing down the lower reaches of the Indus into the Arabian Sea. It is by the remarkable system of irrigating canals connected with these rivers that the Punjab derives its present agricultural importance. The canal colonies in the center of the Province are among the most flourishing agricultural communities in the Indian Empire. On the north the Punjab extends as far as latitude 34° 2' N., and also has a frontier in the Himalayas adjoining Tibet.

The climate of the plains is subject to great extremes in both winter and summer. In January and February the temperature commonly falls below freezing point at night, while it seldom rises above 75° F. in daytime. In summer the fierce dry heat, which is at its worst in the southwest, is only exceeded on the sun-baked plains of Sind. The thermometer then records from 115° to 121° F. in the shade by day and seldom less than 79° by night. There are two rainy seasons, the first between the end of December and the end of February and the second from the latter part of June to the middle of September. The rainfall is heavy on the Himalayas and ranges between 30 and 40 inches in the submontane zone, but it decreases rapidly from the hills until it sinks to a low and variable figure in the west and the southwest.

POPULATION, RAILWAYS, AND CITIES.

The population of the Province was twenty millions in 1911, besides four and a quarter millions of people in feudatory States. No less than 56 per cent of the total population of the Province is supported by agriculture. Artisans comprise barely 20 per cent, while commerce and the professions afford a livelihood to only 2.8 and 2.2 per cent, respectively.

The Province is served by the Northwestern Railway, which, with its feeders and strategic extensions, commands the whole of the Province and links it up with Karachi on the Indian Ocean (Province of Sind), its natural port. Into Karachi is poured all its agricultural wealth, and through Karachi come the sugar and the piece goods, the bullion, hardware, and copper that are brought in exchange. In addition to 3,750 miles of railway there are 2,000 miles of metaled and 20,000 of unmetaled roads, which connect town with

town and village with village and over which the produce of the country is brought to the markets.

As regards leading cities of the Punjab, according to the census of 1911 there were 232,837 persons resident in Delhi, 228,687 in Lahore, and 152,756 in Amritsar. Aside from these three largest towns there were 38 other towns with populations of 10,000 to 100,000. Villages numbered 33,421, of which 11,825 contain 500 persons or more. Except in the hills and in the southwestern districts these are compact groups of dwellings, each of which is provided with an almost complete establishment of trades and occupations which, in return for a fixed share of the produce of the soil, supply almost all the simple necessities of the inhabitants. The town of Lyallpur, in the center of the Province, now rapidly growing, had a comparatively recent creation from sudden influx of population on a large tract of country only opened up by irrigation within the last eight years. It is an important center for trade in agricultural implements.

RACE DIVISIONS AND ASSOCIATION—COOPERATIVE CREDIT.

The Mohammedans form the most numerous community in the Punjab, being about 50 per cent of the whole population, while Hindus are about 35 per cent and Sikhs about 10 per cent. Nowhere in India is the caste system looser than in the villages of the Punjab; and even in the towns, where its bonds are more rigid, Hindus of the higher castes will eat with each other. It is only within the Delhi division that strict Brahmanism comes into evidence. Occupations, however, continue hereditary, even among the Mohammedans, and the action of the new economic forces has not yet materially disturbed a system evolved by the necessities of an immemorial past. The typical Punjabi is tall, spare, and muscular, attaining a splendid physique in some districts.

The idea of cooperative credit has taken firm root in the Punjab, the number of societies having risen from about 300 in 1901 to over 1,000 in 1911 in the 24 districts where they have been introduced. The growth and extension of these societies are a hopeful feature in the solution of financial difficulties connected with purchase of agricultural implements. The Agricultural Department of the Punjab Government has hopes that even steam plows may be purchased and used cooperatively in districts where no individual farmer would have nearly sufficient means to buy one, or sufficient land to make it worth while to use one for his own purposes.

PLOWS IN SOUTHERN INDIA.

The local provincial governments are doing their utmost to promote the use of up-to-date plows suitable to the country; moreover, the cooperative credit movement is now putting it within the means of farmers to buy the best imported plows, where previously this was impossible. In the Madras Presidency alone about 23,000 persons borrowed money in 1912 for productive purposes through the instrumentality of cooperative credit.

The imported plows used in southern India are of Scotch, Canadian, and American types. As the native farmers who wish to buy

imported plows depend largely on the advice of Government implement depots, the views of their directing officials have a great deal to do with the prevailing types purchased. In the State of Mysore, for instance, the Director of Agriculture, Dr. Leslie Coleman, who is a Canadian, has strong opinions in favor of the special advantages of both Canadian and American plows as being well adapted to conditions in southern India, and he has had much to do with the encouragement of their sale in the Province of Mysore.

THE KOLAR MISSION PLOW.

At the Government implement depot for farm implements in Mysore there are available for sale a Canadian plow which turns a furrow to a depth of 6 to 8 inches and a width of 8 inches, plowing from 1 to 1½ acres a day, and costing about \$10, complete with cast share. There is also offered to purchasers a plow made by an American Methodist Industrial Mission (the Kolar Mission), the essential parts of which, however, are manufactured by a leading firm in the United States, except the beams and handles, which the mission makes. This beam is of wood, so that it is easily repaired or replaced in case of breakage even in small villages. There is an arrangement for raising or lowering the beam to suit different sizes of bullocks. The depth of the furrow may be increased or decreased by lengthening or shortening the draft chain. It requires a draft of about 250 pounds for a medium-sized pair of bullocks, makes a furrow about 5 inches deep and 7 inches wide, plows from three-fourths to 1 acre a day, and costs about \$5.60; with a 5½-inch steel share the cost is about \$5.30. Though this plow will not do for heavy black cotton soil, it is very well suited for the great majority of soils met with in southern India.

This Kolar Mission plow, which is essentially of American manufacture, seems, on account of its lightness, at present the most popular plow on the south Indian market. When it was first introduced about three years ago its advantages were so obvious that the supply could not meet the demand. In 1912, out of about 200 plows sold by the Mysore implement depot, about 140 were of this type. The industrial mission referred to also makes a cheaper and lighter type of plow suitable for small bullocks. It has a single handle and wooden beam that can be adjusted to the different sizes of bullocks. The share is of steel and reversible, so that when one end is worn out the other may be used. Nearly 50 of these plows were sold by the Mysore implement depot in 1912. Owing to the gritty nature of the soil in many parts of southern India, the plowshares show considerable tendency to wear out underneath, so that easily detachable slip noses are desirable to meet this wearing strain. The use of these, it is said, may very greatly lengthen the life of the plow. As illustrative of the demand for extra parts, although the Mysore implement depot sold in 1912 about 200 plows, yet it also sold 227 steel shares, 41 cast shares, 71 slip-point shares, and 136 slip points. This implement depot has received quotations from American manufacturers which indicate that the type of plow most desired can be entirely made in the United States at a cheaper price than it can be turned out from the imported American parts by the local industrial mission, and though there would be regret in withdrawing governmental patronage from the mission, yet it seems quite likely that in the future the American offers will be accepted.

DISK HARROW.

American disk harrows are strongly recommended by the Mysore implement depot, which stocks them, especially a type having a number of revolving, concave, steel disks 14 to 16 inches in diameter, with scrapers to prevent the disks from being clogged by the wet soil. It is said that the chief advantage of this tool is that it may be put on the ground when it is too dry for any other tillage implement. The land may thus be disked after the harvest and its water-absorbing capacity greatly increased, so that the land would be in a fit condition for plowing even after a rainfall of about 60 inches.

Moreover, the disk harrows are capable of turning out four or five times the amount of work done by a plow in a day, and in many parts of southern India may be advantageously substituted for the latter where shallow plowing is considered sufficient. Lighter harrows with six disks are manufactured by the local industrial mission, and also six-shovel cultivators, costing only \$4, designed to stir and pulverize the previously plowed soil when it has been compacted by rains. The shovels are made of steel and can be resharpened when they get dull.

The disk harrow seems to have been more effective than any other implement in obtaining a tilth from the mass of lumps which often results from plowing, for the black soil of western India is difficult to pulverize. A few disk harrows of American origin have been used and sold. The market in this case is not so ripe as it is in the case of plows, but it is likely to develop, especially in the irrigated tracts.

MOTOR AND STEAM PLOWING.

The possibility of making use of motor-driven plows in southern India has been given slight consideration, as it is recognized that the pressing need of the country is first to educate the farmers out of their present primitive implements to the use of cheap and simple imported plows. There may, however, in time be a favorable market for motor-driven plows. As an instance of the possible beginning in such a direction, the Director of Agriculture in Mysore has had inquiry from a leading landowner, whose bullocks died of rinderpest just as they were needed for plowing, for a set of two or three plows capable of going from 6 to 8 inches deep and driven by an engine burning kerosene or coal oil as fuel.

AGRICULTURAL IMPLEMENTS IN WESTERN INDIA.

As to particular types of implements needed in western India which might be furnished from the United States, the one most urgently required is an efficient seed drill. The one now used costs only from about \$2.50 to \$3; local agriculturists would be prepared to pay up to six times this amount for a reliable drill. There are some known makes of drills in the United States which provide what is wanted here, according to one of the foremost agricultural authorities of India, and he thinks that with a little pushing the market here is ripe for their introduction. He states that simple 5-hoed clipper drills, capable of easy adjustment for variable distances between seed to seed in a row, and easily drawn by one pair of bullocks, are the kind most suitable to Indian conditions.

On the so-called black soil tracts of western India there has been a rapid adoption of an iron plow in the last five years. Such a plow to be of use must be fitted so that bullocks can be yoked to it, and must be prepared to go up and down and not around a field. The plow which has the market at present in western India is one made at Ipswich, England, but a slightly more expensive American plow is also occasionally sold. Several local makers are also now turning out plows which only differ in detail from the English and American plows known here. Already in the last five years many thousands of plows of these kinds have been sold and the market is constantly widening. If any American plow as good or better than those now available in Bombay can be sold at a less cost, there will be a demand which will steadily grow in importance. Plows with absolute simplicity, which could have shares easily replaced on moldboards, and which could be offered as low as \$13 apiece might, he thinks, be sold by thousands.

DISK HARROWS—REAPERS.

There seem also possibilities in the use of a light but effective disk harrow. The black soil of western India is difficult to pulverize, and the disk harrow seems to have been more effective than any other implement in obtaining a tilth from the mass of lumps which often results from plowing. A few of American origin have already been used and sold. The market in this case is not so ripe as it is in the case of plows, but it is there, and is likely to develop, especially in the richer irrigated tracts.

There will also be a limited demand for reaping machines in the near future. Some are already in use, the best known being the Rajah, made in Glasgow, Scotland. A reaping machine in order to meet conditions in western India must not only cut dry grass and wheat, but the much thicker-stemmed Indian jowri and bajri, native food grains which are grown on a much more extended scale in these areas. This authority states that he is often asked as to a suitable machine, and answers that a comparatively cheap but simple type with a cutting bar not very long and fitted for use with bullocks is what is needed. The day has hardly come for complicated machines fitted with a large number of labor-saving devices.

CHAFF CUTTERS.

Wherever large crops of jowri, bajri, and maize (corn) are grown, as in the greater part of the Bombay Presidency, the stalks of these crops form the principal cattle fodder. In many places these stalks are fed to the cattle without being cut up or chaffed; the cattle then eat only the tops and leaves, and reject the stripped stalks. To avoid this to some extent, it is the custom in a few places to cut the bundles of stalks into three parts and feed these separately to the cattle. Even when this is done it is difficult to get the animals to eat the long and stiff middle parts of the straw, while the butts are nearly always rejected.

This being the case, it is economical to use the chaff cutters to mix the whole of the straw together, and so avoid the waste which usually occurs. With this machine the coarse stalks are cut into short pieces with little labor, and such finely chaffed fodder is eaten with relish by the cattle which thus waste little. It has been found on trial that if jowri stalks are fed without cutting, about half their

weight is wasted. If they are cut with a hatchet and then fed, about one-third will be wasted. If a chaff cutter is used, only about one-eighth will not be eaten by the cattle. Recently chaff cutters have been introduced on Government farms, and a few have been also employed by intelligent cultivators and rich landholders. If a man who has to feed four cattle makes use of the chaff cutter, he would save the purchase price in a month. English chaff cutters are obtainable in Bombay. Indian-made machines sell for about \$3.20 each.

GOVERNMENT AIDING SALES.

American manufacturers having implements suited to conditions in western India, might effect sales more easily if reasonable stocks could be kept with dealers at Bombay. The Bombay Agricultural Department would like to encourage business by local agents or direct representatives of implements, which could obviously form agricultural prosperity, and it would even itself endeavor to find customers for such agents and charge not over 1 per cent commission, or just enough to cover whatever special work it may entail in the matter. While the Government does not like to have any commercial dealings itself in agricultural implements, especially not in competition with private dealers, yet when suitable goods can not be bought of local agents, or when their prices seem to include excessive profits it seems necessary for the Government to import implements of its own account to retail at fair prices to those who need them.

STEAM THRASHING.

Steam thrashers have been in use in India on a few large estates under European management for a number of years, although little has been done toward their general introduction. The common opinion that steam thrashers are unsuitable to India seems to be based on insufficient consideration of local agricultural problems. There is great need of introducing mechanical power to relieve the pressure on working cattle. Such steam threshing machines as have been tried in India have not been adapted to local requirements such as the necessity for closely grinding the straw into the fodder known as "bhusa," which chopped-up preparation is the most common food for cattle in India. Steam thrashers specially designed by an expert of a British firm have recently been tried on the experimental farm near Cawnpore. The previous steam threshing machines which have undertaken to make "bhusa" have consisted merely of ordinary standard types of thrashers with attachments for straw chopping and bruising. Such machines have not met with entire success, the capital cost and power required being high compared to the output. The cost of the thrashers, recently tried, with engines landed at Cawnpore amounted to about \$1,666, while the cost of the machine alone amounted to about \$890.

It is stated that during nine months of the year, when such engines are not required for threshing, they could be used for a variety of other work, such as cotton ginning, grinding flour, crushing sugar cane, and pumping.

Although it may be doubted whether threshing machines are really wanted in western India at present, a good, simple, and cheap winnowing machine would meet with a fair market. Several have

been tried and work very well with all except the smaller grains, but they are expensive from a cultivator's point of view. A bulletin on this subject, with a description of a machine for cleaning cotton seed intended for sowing, can be obtained from the agricultural college at Poona.

GRAIN ELEVATORS AND DRYING PLANTS.

The first grain elevator in India has been completed at Lyallpur, the center of one of the largest irrigation districts of the Punjab Province. This elevator will furnish an experiment of important significance to the grain trade of India, and if successful it will undoubtedly stimulate the building of many other elevators in this country and lead to far-reaching and important changes in present methods for handling, storing, and marketing the grain crops of India. The material of the new elevator is reinforced brickwork, and the structure is to comprise storage bins.

MARKETING THE CROP.

At present Indian wheat is always rushed to market just as quickly as possible, in order to escape damage from weevil, rats, and other causes. The chief objection to elevators, as voiced by firms in the grain trade, has been that it would never be desirable to store wheat for any length of time, owing to such liability to damage. However, with proper construction and equipment, and especially by making use of drying plants to eliminate moisture, without which weevil could not exist, it would seem that such objection could not hold good, and that, on the contrary, if the wheat were dried, losses from weevil need no longer occur at all.

SPRAYING MACHINES.

A demand has arisen in the Province of Mysore, in southern India, for knapsack sprayers with which to combat the green-bug pest, which has made its appearance in this Province as a serious menace to coffee plantations covering over 100,000 acres. The principal knapsack sprayer now on the market here is made in Birmingham, England, weighs about 14 pounds, has a capacity of about $3\frac{1}{4}$ gallons, and sells for \$14.60, complete with double-swivel nozzle. This is the first occasion on which Mysore coffee planters have been obliged to spray against this insect, but in the Nilgherry Hills district, in the Madras Presidency, the pest has been established for many years, and the jungle, and even the shade trees, are infested with them. It can only be kept in check and ruin of plantations averted by pruning off as many infected shoots as possible, burning them, and then spraying.

FUNGUS ON ARECA PALMS.

Hitherto the chief use for spraying machines in southern India has been for checking the ravages of a fungus known as "kole-roga," which lives in and on the nuts of the areca palms that supply the "supari" generally used for chewing by the natives of India and also frequently used as an ingredient for tooth powders and pastes. This parasite frequently passes over into the tree tops and kills them. It is said that the annual loss to areca-palm growers from this cause in the Native State of Mysore alone amounts to over \$100,000. The

other district of India chiefly infected with the parasite is the Malabar coast, especially in the vicinity of Cochin. The rains play an important part in the origin and spread of the pest each year, in that they give the conditions of moisture favorable for the growth of the fungus.

The agricultural depot of the Mysore government started several years ago to give serious attention to the introduction of sprayers to rid the areca palm of this destructive fungus, and at first encouraged the use of large barrel sprayers fitted on wheels as a cart, with a long line of canvas pipe to reach to the top of the trees. Although it was found effective, it was a cumbersome apparatus, and it was therefore decided to import small knapsack sprayers holding about 1 gallon of liquid and worked by compressed air. Accordingly, some were ordered from Germany, and the 1912 report of this implement depot states that they have proved highly satisfactory, being easy to handle and not likely to get out of order. Their landed cost here is about \$6.50. Their use is now being widely demonstrated by the implement depot, and a great many are being sold.

Generally speaking, probably no other country in the world suffers so much from the ravages of insect pests as does India, and yet the use of spraying machines by the vast agricultural population has been very limited. One important reason for such restricted use of sprayers has been that the usual spraying preparations, composed of arsenical compounds, cause poisoning of cattle, as, unlike most other agricultural countries, little attention has been paid in India to the use of suitable fencing material which would keep the cattle off sprayed crops.

GOVERNMENT EXPERIMENTS.

In making a study of the best means to overcome this difficulty, the Department of Agriculture of India has been making experiments with spraying substances readily obtainable in India, effective at weak strengths against insects, but which would not injure cattle or the plants themselves and could be applied in small quantities, being soluble in water and unaffected by the atmosphere. As fulfilling such requirements, chromate of lead is now being recommended, especially as it is easily made in paste form, is yellow and can be easily seen on a sprayed plant, does not decompose, is not easily washed off, and contains no arsenic. Various dry paints were also experimented with and found to be effective as deterrents. Naphthaline is also recommended as a harmless deterrent on vegetable crops intended for consumption, though useless as a field insecticide. A monograph has been published containing the results of these experiments, which were made by Mr. H. Maxwell Lefroy, imperial entomologist, and Mr. R. S. Finlow, fiber expert to the Government of Bengal. If the new preparations thus suggested meet with favor from agriculturists in India, there is no doubt that a much wider demand for spraying machines will be created.

American manufacturers of spraying machines and spraying compounds who may desire to promote the sale of their goods in India would do well to communicate with the various implement depots in the different Provinces, which nearly all carry sprayers in stock to sell to the native farmers. If they can secure official approval of such articles by these governmental agencies, their sale should be very much helped.

IRRIGATION.

Irrigation in India is of tremendous economic importance to the country, and the remarkable progress which has been made in recent years in great irrigation projects has furnished a substantial cause for much of the recent increased prosperity in this Empire.

Irrigation is an absolute necessity for immense areas where otherwise cultivation would be practically impossible, and it is of great assistance to further large areas where otherwise cultivation would be precarious, irregular, and the country subject to devastating famines. There are large tracts of land in India—such as the Desert of Sind and the southwest Punjab—which are practically rainless, but which to an important extent are being opened up to agriculture by big irrigation schemes. There are other sections—such as the Deccan Plateau in southern India—where the rainfall is not steady and where at long intervals crops may be subject to damage from blazing sun and hot winds and have no opportunity to mature except by irrigation. There are still other sections where a single crop, called the Kharif or rain crop, can in normal years be raised by unassisted rainfall, but where the second or cold-weather crop, known as the Rabi crop, is dependent on irrigation.

Altogether about 65 per cent of the great population of India is dependent upon agriculture for a livelihood, and indirectly the entire population is more or less dependent upon the success of agriculture. Generally speaking the annual visitation of the monsoon, or rainy season, is to India what the River Nile is to Egypt, furnishing as it does the main source of agricultural prosperity and national wealth. But there are many sections of India which the monsoon either wholly or partially neglects, while there are other sections which would secure only an insignificant benefit from the monsoons unless, as in the case of the River Nile in Egypt, the course of nature were assisted by different kinds of irrigation work.

CLASSES OF WORKS—GOVERNMENT PROJECTS.

Irrigation works in India are of three main classes—wells, tanks, and canals. In the first two the arrangements are more or less primitive, notwithstanding the enormous areas of India which are more or less dependent upon them. By far the most impressive works, however, are those in the canal class, and it is on these that the Government of India and provincial expenditures have in recent years been vast, and led to far-reaching beneficial economic results. The report of the irrigation commission of 1901 showed that in 1901, out of an area of 226 million acres annually under crop in the irrigating provinces of British India, in round numbers 44 million acres, or 19 $\frac{1}{2}$ per cent, were ordinarily irrigated. Of the total area irrigated 18 $\frac{1}{2}$ million acres, or 42 per cent, was watered by State works (canals and

tanks) and 25½ million acres, or 58 per cent, from private works of which rather more than one-half was from wells.

This commission reported that the field for construction of new works of any magnitude on which the net revenue would exceed the interest charges was limited, being restricted to the Punjab, Sind, and parts of Madras—tracts for the most part not liable to famine. They recommended that works of this class should be constructed as rapidly as possible, not only because they would be profitable investments but also because they would increase the food supply of the country. The commission sketched out a program of new major works to be constructed in different parts of India which would cost not less than \$146,666,666 and would result in an increase of 6,500,000 acres to the irrigated area. They estimated that the construction of these new works would impose the permanent yearly burden of about \$2,466,000 on the State.

FIFTY-FIVE PLANS.

Among the great State irrigation projects suggested as a result of this commission's report in 1901—the most important among 55 schemes either under construction, awaiting sanction from the Government of India, or under examination by the Government—may be mentioned especially the great triple project of the Upper Chenab, Upper Jhelum, and Lower Bari Canals. About one-third of this immense work was completed and ready for utilization in 1912, another third in 1913, and the remaining third was to be completed during 1914 or 1915. The effect of this great work will be to irrigate altogether 1,871,235 acres a year at a capital cost of about \$34,000,000, which, it is anticipated, will return about 7½ per cent on the money invested.

GOVERNMENT WORKS IN OPERATION.

In the Government review of irrigation operations during the official year 1912–13, irrigation works are divided into two main classes, major and minor. The former are subdivided into what are known as productive and protective works. Productive works are those which are financed from loan funds on the understanding that, 10 years after completion, they will yield sufficient revenue to cover their working expenses and an annual interest, usually calculated at 4 per cent on the capital invested. The protective works are designed mainly as a protection against famine. The great irrigation systems of India are mainly of the productive class. As far as completed works go, they now number 56, of which number 43 are extremely profitable. In 1912–13 they paid nearly 12 per cent on their capital outlay and at the end of that year they had contributed nearly \$145,995,000 to the general revenues of the country, against \$114,362,750 expended in their construction.

The total area irrigated in 1912–13 by the productive works was 16,147,799 acres and the value of the crops raised on this area was estimated at \$216,559,250. In this total the canals of the Punjab played a very important part. The productive canals of this Province irrigated 7,500,000 acres out of the 16,147,799 total and earned an interest of 16.5 per cent on the capital cost.

Under the protective head there were 30 works in operation. Although £4,000,000 (\$19,466,000) have been expended upon this class of works, it is too early to judge of the ultimate results. Some of these works are still in progress; even those which are completed are still in course of development. The Secretary of State for India has sanctioned a project, the estimated cost of which is \$7,299,750, for the benefit of the Bombay Deccan, where famines are of frequent occurrence.

MINOR IRRIGATION WORKS.

The so-called minor works are numerous and in the aggregate of considerable importance. They are of all descriptions as to size and scope. A few in Madras are purely navigation works; in Burma they include land reclaimed by means of flood embankments; in Sind they take the shape of highly profitable inundation canals—that is, channels taken off from streams at a comparatively high level and which convey water only when the river is in flood. Generally throughout India, however, these works are "tanks" or lakes formed either by excavation or by damming up a valley, in which the monsoon rainfall is caught and stored for use during the dry season. Many of them are of very old origin. In total, they irrigate 8,000,000 acres. Taking all these classes of works together, the total capital outlay up to the end of the year 1912-13 has been very nearly \$194,660,000. The net revenue is nearly \$19,466,000, with a return of over 8 per cent, and the irrigated area is over 24,500,000 acres. By comparing this acreage with the total cultivated area in Upper and Lower Egypt, which is only 5,500,000 acres, it will be seen how vast the operations in India are. The future potentialities of irrigation in India exceed those of almost any other country and it is probable that the capital expenditure on irrigation works will be doubled in the comparatively near future.

IRRIGATION ADDS LARGE AREAS FOR CULTIVATION.

In the Punjab, between the years 1908 and 1911, the capital expenditure upon irrigation works amounted to nearly \$40,000,000, and the capital thus invested is now returning in net revenue to the State nearly 15 per cent. A great new triple canal project in this Province which is expected to be completed in the spring of 1915 will increase the irrigated area by 28 per cent. Altogether the Punjab, with a total area of 57,315,026 acres, has at present 28,097,690 acres under cultivation, with large additions to such cultivated land probable in the future.

The figures given below do not take account of the fields sown more than once in a single harvest. If second sowings are counted separately the total works out at 11,316,611 acres, as against 10,357,306 in the previous year. By way of comparison it may be mentioned that the Madras Presidency in 1911 had 9,905,537 acres of land irrigated, the United Provinces, 8,723,197 acres, Bengal, 5,269,606 acres, the Province of Sind, 3,258,546 acres, and no other Province up to 1,000,000 acres.

The latest report of the Department of Agriculture of the Punjab for the year 1911-12 showed irrigated areas, compared with the previous year, as follows:

Irrigated by—	1910-11	1911-12
Wells.....	Acres.	Acres
Tanks.....	3,071,309	3,420,444
Government canals.....	10,551	7,435
Private canals.....	6,393,059	6,964,439
Other sources.....	451,907	414,480
Total.....	168,921	147,804
	10,093,837	10,954,602

PROVINCIAL AND LOCAL UNDERTAKINGS.

Nearly every large Province in India has vast and daring irrigation schemes. The upper Swat Canal of the Northwest Frontier Province and the triple canals of the Punjab, both of which are approaching completion, are daring pieces of engineering. The great Sukkur project of Sind has recently been rejected by the Secretary of State owing to its many deficiencies, but it is still hoped that it will be finally sanctioned after the engineering difficulties have been solved.

In the Punjab the Sutlej Valley scheme is nearly completed and will doubtless soon add a vast area of land to the cultivated acreage of the Punjab canals. In the Madras Presidency the large reservoir projects of the Cauvery and Kistna have, it is said, received the approval of the technical advisers of the Government. Bombay has the Gokak Canal scheme, which is shortly to be submitted for approval to the Secretary of State. In fact, there are many large and costly schemes proposed and being proposed, but there is every hope that the engineers will be able to overcome the difficulties connected with some of them, that the State will sanction those that have not yet received its consideration, and that the next 25 years will witness an astonishing progress in irrigation and the deserts of India converted into habitable and producing areas.

Among other irrigation works recently in process of construction are canals from the upper Godaveri River in the western part of the Deccan, costing about \$3,200,000, now nearly finished; also, in the same region, the canals from the Pravara and Nira rivers, costing, respectively, about \$2,860,000 and \$8,500,000.

In the Central Provinces productive and protective works, chiefly comprising large canals with storage from the Mahanadi, Wainganga, and the Tandula Rivers, with various tank projects, have been sanctioned, estimated to cost over \$13,000,000. In Madras the work has been chiefly investigation and preparation. The projects to be undertaken will add 20 per cent to the present irrigated area in the Presidency. In Bengal the Triboni Canal in Behar, costing \$2,500,000 will protect an area very liable to famine. In Burma the scope for irrigation works is small. Protective embankments have, however, proved of great value.

Of the four great canals or irrigation works sanctioned in Upper-Burma, one is still to be constructed, the Ye-u Canal in Shwebo district. It takes its source of supply from the Mu River, the head weir being common to this canal and the Shwebo Canal, which is practically completed. The total cost of the Ye-u Canal was to be \$1,142,649. It was estimated that the net return on the capital outlay would be equal to 5.58 per cent.

The length of the main canal will be 197,841 feet and that of the Mayagan branch, 84,000 feet. There will be 24 bridges on the main canal and seven on the branch canal.

The enormous scope still open for irrigation in India is apparent from the fact that, in addition to the immense works already under construction or sanctioned by the Government, there are under consideration or investigation other works estimated to cost nearly \$140,000,000.

COST OF WATER.

The charge for water from these irrigation works varies considerably, depending on the kind of crop, the quantity of water required and time when it is required, quality of soil, regularity of demand and the value of irrigation and increasing the outturn. In the immediate vicinity of Poona, in the Bombay Presidency, a rate of \$16.50 per acre is paid for sugar cane, which is exceptionally high, but apparently fair because the cultivators can here raise crops valued at about \$260 per acre. The ordinary rate in the Punjab for wheat, which is the principal crop, varies from about \$1.10 to \$1.36 per acre, and for fodder crops from about 80 to 96 cents per acre. The charges for irrigation may be taken as varying from 10 to 12 per cent of the value of the crop, except in Bengal and the Bombay Deccan, where the average is little more than 6 per cent.

HOW SUPPLIES ARE PURCHASED.

The greater part of the tools, machinery, and materials used for the great Government irrigation works in India are obtained in England through indents furnished the India office in London by the public works departments of the Governments of India and of the different Provinces. A large amount of supplies and material are also purchased in India itself, as convenience or necessity may require. As a rule Government engineers will underestimate their requirements for a given year, and so frequently be obliged to make emergency purchases locally. A large number of tip trucks, which run on a track and are of German construction, are used in connection with irrigation works. A leading local firm always has had these in stock ready for immediate delivery when required. Generally speaking the cost of labor in India is so cheap that there is not the necessity of resorting to labor-saving devices as in countries where labor cost is much more expensive. The cost of labor, however, in India is steadily rising, and is causing more attention to be paid to labor-saving machinery in connection with public works. It is likely that such important apparatus as concrete mixing machines will be much more used in the immediate future than they have been in the past.

EXPERIMENTS DIRECTED BY AMERICAN EXPERT.

In the Bombay Presidency, an American well-boring expert, Mr. William C. Doris, has been under Government employment for about a year in work of boring deep wells to obtain water that could not be reached by the ordinary Indian wells, which seldom go

below 40 feet in depth. With boring machines imported from the United States, Mr. Dooris has been finding abundant supplies of water which would be valuable for irrigation and for water supply for towns, at depths of from about 700 feet to 1,000 feet, in districts irregularly or sparsely supplied with ordinary rain or river water. Some deep borings are being made at Ahmedabad, the second city of the Bombay Presidency, and it is hoped that as a result this large city, now seriously hampered by scarcity of water, may find underground abundant supplies for domestic and industrial uses. The work of Mr. Dooris, which is still more or less experimental, is being watched with considerable interest by the different public works departments in India, and if it proves entirely successful there will undoubtedly be a strong movement in India in favor of deep-well boring for irrigation purposes, as practiced so successfully in many parts of the United States.

TUBE WELLS FOR IRRIGATION.

In order to meet the difficulty experienced in many parts of India in obtaining a sufficient supply of water from ordinary wells for irrigating adjacent fields, which is due to serious disturbance and displacement of subsoil when a safe velocity of taking out water is exceeded, a convoluted-tube well, especially designed for discharges of 5,000 to 45,000 gallons per hour, is being manufactured in large numbers at Cawnpore, India, and is becoming popular throughout the northern part of this Empire.

A description of this type of well appears in the August, 1913, issue of Indian Industries and Power:

The convoluted-tube well differs from the many forms of tube wells on the market in that it is the only tube well which has the waterway area of the perforations. The tubes are made from sheet steel, specially shaped to obtain this result, which prevents any change of velocity between the straining material and the body of the tube and thereby reduces friction and loss of head to a minimum.

The straining material is composed of heavy copper wires lying parallel and woven with copper ribbons; this arrangement forms a substantial and lasting material combined with a maximum of fine slots for the percolation of water.

Convoluted-tube wells may be sunk direct into the ground and worked by attaching the pump to the upper end of the plain tube; the plain tube then becomes the suction pipe of the pump. This arrangement is particularly convenient where spring level is within the suction action of pumps worked on ground level. Considerable

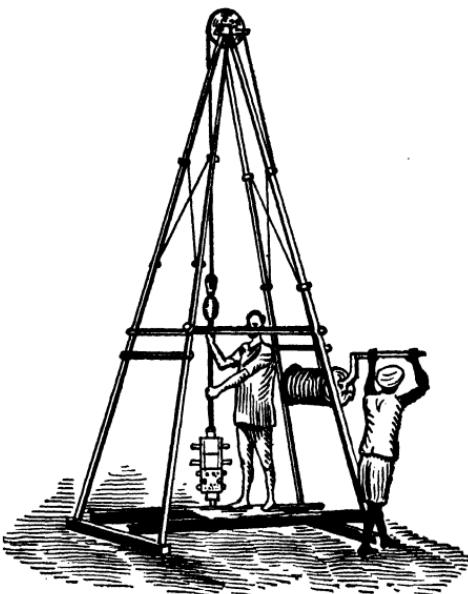


FIG. 15.—Convoluted-tube well.

care should be exercised in fixing the pump level relatively to water level, as various forms of pumps differ very considerably in efficiency on different suction lifts; generally the suction should be as short as possible.

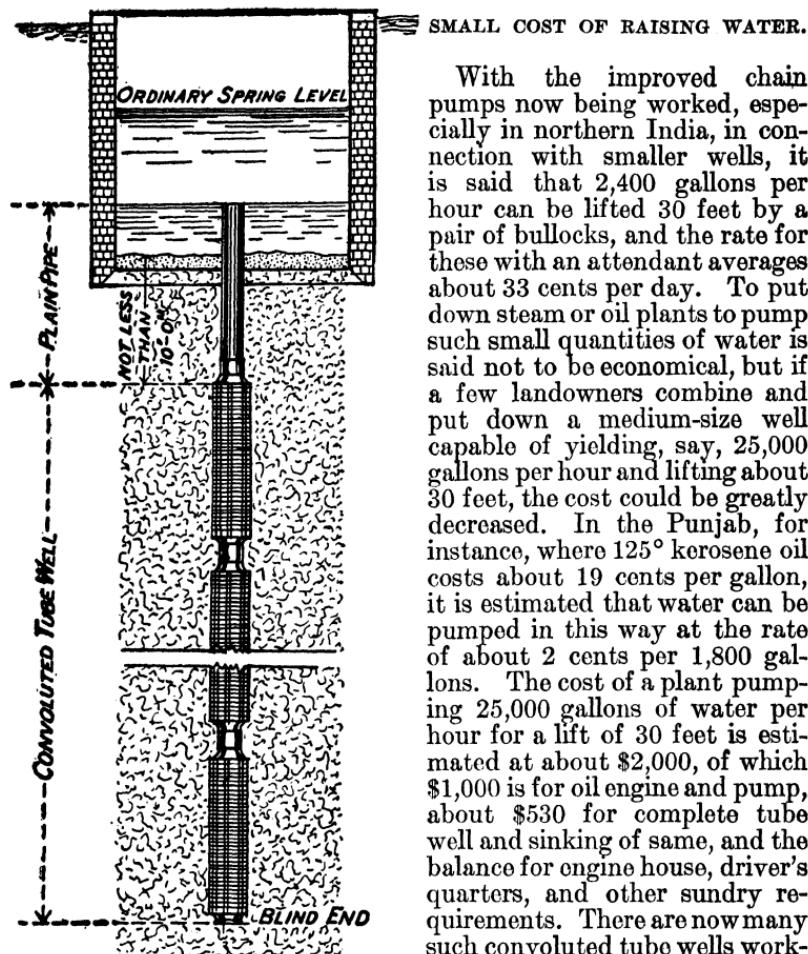


FIG. 16.—Section of convoluted-tube well.

public water supplies and for irrigation purposes.

COST AND EFFICIENCY OF THE TUBE WELLS.

The catalogue of the engineering firm in Cawnpore which manufactures the tube wells described states that the convoluted-tube well, having undergone exhaustive trials in the Punjab, is proved to have the advantage of yielding an exceptionally large supply of water, of combining lightness with strength, and of being suitable either for increasing the water supply of existing wells or for direct pumping from the tube. One tube delivering 45,000 gallons of water per hour

SMALL COST OF RAISING WATER.

With the improved chain pumps now being worked, especially in northern India, in connection with smaller wells, it is said that 2,400 gallons per hour can be lifted 30 feet by a pair of bullocks, and the rate for these with an attendant averages about 33 cents per day. To put down steam or oil plants to pump such small quantities of water is said not to be economical, but if a few landowners combine and put down a medium-size well capable of yielding, say, 25,000 gallons per hour and lifting about 30 feet, the cost could be greatly decreased. In the Punjab, for instance, where 125° kerosene oil costs about 19 cents per gallon, it is estimated that water can be pumped in this way at the rate of about 2 cents per 1,800 gallons. The cost of a plant pumping 25,000 gallons of water per hour for a lift of 30 feet is estimated at about \$2,000, of which \$1,000 is for oil engine and pump, about \$530 for complete tube well and sinking of same, and the balance for engine house, driver's quarters, and other sundry requirements. There are now many such convoluted tube wells working in northern India, especially the Punjab Province, both for

is claimed to be capable of irrigating 400 acres, and the cost of one tube fixed complete is less than one-tenth of the cost of ordinary wells of the same capacity.

The charges for putting down these tube wells are estimated at from \$2 per foot for boring up to 50-foot depth with 8-inch casing pipe up to \$5.30 for boring up to 150 feet with 15-inch casing pipe. For increasing the supply of water in existing wells where boring commences at the bottom of the well the charges are 66 cents per foot extra. For boring these wells steel sludgers are used, arranged for firmly screwing into the bore tube, the continuation of the jointing socket forming a knife-edged seating for the valve, which consists of a vertical steel spindle working in a bracket.

CHAIN PUMPS.

Chain pumps are manufactured by this Cawnpore firm and sold largely throughout northern India for short lifts from canals, rivers, or wells up to 30 feet, with hand power and with bullock power up to 45 feet. One of these sells for about \$20 a pump, with 5-foot depth, approximate capacity 9,000 gallons, diameter of pipe, in inches, 4½, and irrigating 36 acres per day at 10 hours per day.

A catalogue of this Cawnpore firm gives many other interesting details as to the use of tube wells and chain pumps in India and presents details of the advantage of using such appliances, especially as to their economy and sanitary advantage, for towns in India which would substitute them for present primitive methods of deriving water supply from the village tank.

INFLUENCES OF FAMINES.

Every famine which occurs in any part of India gives a great impetus to well digging, and recent reports as to famine-relief operations in different Provinces, especially in connection with the partial failure of the monsoon in 1911, give interesting evidence as to the active governmental encouragement of sinking wells. For instance, the Report of Famine Operations in the Baroda State for 1911–12 mentions that during that official year 3,368 wells were constructed with the aid of Baroda Government loans and 2,425 wells were sunk with private capital. A special grant of \$6,500 was allowed by the Government for boring wells in several villages where no water was obtainable and \$12,200 additional was allotted to the director of agriculture for purchasing boring sets from Cawnpore, and another \$2,000 for purchasing small chain pumps for demonstration and to induce cultivators to get such pumps with the help of Government loans, if necessary. Also during this period various district local boards in Baroda appropriated large sums for sinking new and for repairing and deepening existing wells for the water supply of villages. The Government also appropriated \$1,200 for piping, which will be gradually recovered from the cultivators whose wells have been successfully bored. An expert boring establishment was maintained to guide these operations, and a set of rules, based on the British model rules, was sanctioned for charging the expenses of working to the cultivators applying for the use of boring tools.

With a view to extending well sinking in Baroda as an insurance against famine, the Maharaja of that State has permanently reduced the interest charges on loans necessary for well-sinking operations to only 3½ per cent. His Highness also ordered that gifts of 10 per cent on the total expenditure may be given to agriculturists who sink wells with their own capital without resorting to Government loans.

American drills are much used in India for well boring. For deep artesian-well boring, American methods and tools seem to be considered in India as representing the most up-to-date ideals possible. American drills have been specially imported by several local Governments, contrary to their usual policy of buying implements and machinery only in England, and the public-works department of one provincial Government—the Bombay Presidency—has lately engaged an American boring expert for its irrigation undertakings in districts frequently afflicted with famine.

WELL-BORING MACHINES IN HYDERABAD.

A letter from Mr. John Kenny, Director of Agriculture of the Government of His Highness, the Nizam of Hyderabad, states that he had received a great number of catalogues of well-boring machines and other appliances useful for agricultural work in that State. However, few of these catalogues mentioned prices, and none furnished information upon which to calculate the cost of articles delivered at Bombay, the nearest port to Hyderabad. This complaint of the secretary of agriculture of this State—by far the largest Native State of India—indicates what has always been a real difficulty in selling American goods in India.

Mr. Kenny mentions that through these catalogues he has learned of one machine that is exactly what is wanted in Hyderabad to test for water, but he is unable to buy it at once because he has no idea of what it would cost delivered at Bombay.

EXHIBITION IN BOMBAY.

In connection with an educational conference held at Poona, in the Bombay Presidency, an interesting exhibition of agricultural implements was organized by Dr. Harold Mann, principal of the Government Agricultural College at Poona. It included a large number of exhibits representing the latest developments in methods and materials suited for agricultural conditions in western India.

Perhaps the most striking of the recent developments of the activity of the Agricultural Department has been the increased attention paid to boring for new supplies of water, and to utilizing existing supplies through power pumping. The agricultural engineer to the Government had an interesting exhibit, including the Musto's boring plant, which has proved exceedingly useful in tapping subartesian water in a number of places in the Deccan, and will easily bore through rock to a depth of 200 feet. In connection with this a deep well pump was shown, which provides for direct pumping from the bore hole when water has been struck, a process that may have a great future in connection with village water supplies.

PUMPS AND ENGINES.

The oil engines and pumps were a feature of the exhibit. A recently planned oil engine and pump, costing \$433 and capable of irrigating $1\frac{1}{2}$ acres of sugar cane, works against a 40-foot head of water and does not need the expensive foundations necessary with most pumps of this class. It costs only \$1.15 per day of eight hours to run (including depreciation), and probably supplies an important need in many districts of western India. The application of power to many other farm operations was shown—such as ginning cotton seed, shredding fodder, and crushing sugar cane. There was also a machine worked by bullocks and suitable for baling grass and other fodder.

PUMPS FOR IRRIGATION.

The use of pumps for irrigation from wells in India has been meeting with such substantial success in many instances in which they have been tried that it seems certain that imports of pumps will show rapid increase in the future, and there certainly seems a vast field for their use in the agricultural development of this section. It is stated that in the Madras Presidency there are nearly 700,000 wells and in the Province of Mysore about 40,000 wells. In most instances these wells are used for irrigation, and are worked either by manual labor or by cattle, chiefly the latter. The governments of these two States have for some time been conducting a campaign of education among the farmers to show them the economy and other advantages incidental to the use of pumps, especially in cases where the water supply from the wells is sufficient to carry on an extensive scheme of irrigation.

It is estimated that a pair of cattle in India can lift 12,000 gallons of water per day from a well 25 feet deep, but that a small engine and pump could lift that same quantity of water per hour. If the engine works eight hours a day the total expenses would be about 66 cents, but if cattle were employed it would take eight pairs of bullocks to do the same work, and few farmers in India could afford to keep so large a number, at least not exclusively for lifting water. If the water supply be much larger, so that the engine can work longer hours, or if the well be deeper, then the comparison in favor of the oil engine and pump is still more favorable, and with large quantities of water the cost of lift irrigation can be reduced to one-fourth the cost of employing cattle.

PUMPS WOULD REDUCE COST OF WELLS.

It also seems probable that as the general advantages of pumping water by modern appliances become better impressed upon the farmers of India, they will also see that it will pay them to dig more wells where water is to be had this way and greatly to deepen present shallow wells, so that there could be plenty of water for the justification of more expensive pumping plants. The prevalent methods of sinking wells in this section chiefly with the aid of cattle is much more expensive than by using engines and pumps. The latter would enable wells to be sunk to much greater depths; in fact, they might be sunk to a depth of 100 feet as cheaply as can now be done only 25 feet, and of course the water can be lifted at a much smaller cost.

These two advantages working together ought to greatly contribute to the extension of well irrigation by enabling the water supplies which exist at greater depths to be utilized.

IRRIGATION BY PUMPING FROM RIVERS.

Besides wells there is considerable scope for pumping from rivers in India. In some rivers water is flowing throughout the year, but the quantity in the hot dry season is small. Usually there is no difficulty in ascertaining whether any required quantity of water can be obtained or not, but it is often troublesome to arrange a pumping station on the banks of a river in such a way that there should be no risk of its being washed away in flood time. Where the river flows within well-defined banks these difficulties are less than when it meanders about a wide shallow bed.

The cost of putting down an engine and pump to draw water from a river is nearly always much greater than from a well. But this is compensated for by the fact that pumping can be carried on continuously, and that therefore the same size of engine and pump will irrigate a much larger area of land than when working on a well which seldom has a sufficiently good water supply to enable the pump to work both day and night.

NO SUITABLE PUMP ON THE INDIA MARKET.

The most influential advocate of the use of pumps in India for lift irrigation is Mr. Alfred Chatterton, who is not only an industrial adviser to the government of the Madras Presidency but is also director of industries and commerce for the State of Mysore. In interviewing Mr. Chatterton, at his headquarters in Bangalore, Mysore, concerning the possibility of American pumps being used to further the agricultural development of southern India, it was stated to me that American pumps had seemed too expensive for the average small farmers here, and moreover they are not quite plain and simple enough for the Indian farmer, who has little mechanical skill, and is apt to carelessly tinker with such appliances and get them out of order. Mr. Chatterton states, however, that there is an immense field in India for engineering firms that would make pumps suitable for local requirements. He hopes that attention will be drawn to the vast possibilities which exist in India for irrigation pumps which could be used as substitutes for the cattle now employed in lifting water. He states that at present there is really no suitable pump on the Indian market, and he believes that the direction in which experiments should be made is in the adaptation of the Humphrey gas pump. This pump is constructed only for dealing with comparatively large quantities of water, but if a small pump could be devised which would work either with gas, petrol, or, still better, kerosene oil, it would effect a revolution in Indian agriculture, and meet with a very big sale.

The price of such a pump should be about \$300 or \$350 at the outside, and considering that nearly the whole of it could be made of 3-inch or 4-inch gas pipes, it should not be beyond the possibilities of engineering science. He mentioned that during the past few years there had been installed in southern India between 300 and 500 oil

engines and centrifugal pumps, but a 3-inch pump, which is the smallest size that can be economically put down, delivers from 10,000 to 12,000 gallons of water per hour, and is beyond the capacity of the vast majority of the wells. A mechanically driven pump which could deliver from 3,000 to 4,000 gallons of water from a depth of 40 feet or 50 feet and is cheap in regard to first cost and simple in its operation, would undoubtedly command an enormous sale.

GOVERNMENT FURNISHES MONEY FOR BUYING PUMPS.

The main difficulty connected with the widespread introduction of pumps into southern India for irrigation has been the poverty of most of the farmers, who must naturally find it not easy without special assistance to raise a capital required for the initial outlay. The governments, however, of the Provinces of southern India in their effort to encourage the use of pumps are now making it possible to finance their purchase. If a farmer has a sufficient water supply and a sufficient area of land to utilize that water supply, he can now secure from the Government a loan for purchasing the pumping appliances desired, and thus possess a pumping outfit which he can pay for out of part of the surplus profits of his cultivation. One firm which has sold many pumps in India has been able to do so successfully under a hire-purchase system, by which the would-be owner of the pump pays one-fourth of the money down and the balance in installments, generally extending over two or three years, during which time he has to pay 8 per cent interest on the balance debited to him. He is thus able to get his engine and pump for a comparatively small initial outlay and to pay the balance out of profits accruing from the use of the pump.

The governments in southern India maintain a paternalistic policy with reference to assisting farmers in the cultivation of their land, not only being willing to loan them money, when the security is good, to assist them in buying desired appliances, etc., but also to instruct them in the sort of equipment most suitable for their use. In fact these governments are now inclined to select, and then to purchase for resale to local farmers, the particular types deemed most advantageous. A well-known English pump, the Rees Roturbo, is being purchased in this way. It would seem, therefore, that if American manufacturers are to attempt to gain a large business for their pumps in India they should acquaint the government officials of the various Provinces with the particular merits of their pumps and endeavor through cooperation or approval of government officials to advance their sale.

PUMPS SUITABLE FOR INDIA.

Mr. Chatterton, who is considered the best authority in India on pumps and motive power, states that during the last four or five years a number of direct-coupled petrol or gasoline engines and centrifugal pumps have been used under his direction and found extremely useful within a limited range of service. He thinks, however, that they would not be practicable machines to place in the hands of native agriculturists for irrigation works, as in the first place the bill for repairs would be much too high and gasoline too costly, and finally

he doubts very much if the Indian farmers could keep such machines in order. He mentioned that for irrigation work in India they would have to run practically 10 to 12 hours a day and for 200 to 250 days in the year.

He says that in southern India these machines have already been used for testing purposes, and the compactness and lightness of the sets render them easy to transport. For such work 4-inch pumps are used, delivering about 20,000 gallons of water per hour, and driven with 2-cylinder 12-horsepower motors. For garden purposes, the small pump that might be exported from the United States for about \$100 might find a market in India. He is inclined to think, however, that while such types of American centrifugal pumps as have been called to his attention are cheap, they possess too low efficiency for general irrigation purposes, and the delivery of water is insufficient except for small gardens. He thinks American manufacturers might better turn their attention to the construction of pumps of reciprocating types, which in his opinion would give better results.

WINDMILLS.

It must be admitted that in comparison with countries like Australia, New Zealand, and Argentina, which do an enormous import business in American windmills, the importation from the United States into India of such useful apparatus for pumping water by the free agency of wind have so far been meager and unsatisfactory. For instance, in southern India, with an area of about 270,000 square miles and a population of nearly 66,000,000 people largely earning their living through the assistance of irrigation, there are said to be not over 20 windmills in use.

EDUCATING THE INDIAN FARMER.

In investigating the reasons for the small use of windmills in India, I find that the principal difficulty lies in the poverty of most of the small farmers, or "ryots." Most of them still pump water by the most primitive and uneconomical method of using their own labor or that of bullocks for such purpose. When, however, the Indian farmer is educated in the use of modern mechanical methods for pumping water and is furnished the means of purchasing up-to-date apparatus, he seems to prefer making use of oil engines, which require much less initial expenditure than do windmills. The fact that windmills when once installed are furnished with free power for their operation, while the fuel for oil engines is not only a considerable item of expense but also shows a tendency to increase in price, appears to be lost sight of to a great extent, or to be met by the argument that windmills are more troublesome and expensive to keep in order than are oil engines. This perhaps is true in India, where the average farmer has little mechanical ability for keeping such apparatus in good order and must depend largely on outside mechanical assistance. With oil engines, on account of their much larger use, such assistance is easier to obtain.

WIND FORCES.

Furthermore, through large portions of India, the wind forces are so slight that it is doubtful if windmills can be of much value. Taken as

a whole, however, the movements of the wind in India, though much feebler than in temperate climates, are fairly reliable and conveniently distributed, the maximum wind force usually occurring in the afternoon when the water in the well will probably be at its lowest level and the work of lifting it out therefore greatest. Furthermore, as a rule, during rainy weather the wind movements are feeble, but water for irrigation is not wanted then; while hot dry weather, when water is most wanted, is usually accompanied by strong winds. It is said that over about five-sixths of the territory of India the wind forces are not strong enough to especially encourage the use of windmills, but that over about one-sixth of the country conditions are highly favorable for their use.

The meteorological records of India indicate that in most of the northern part of the Empire conditions do not especially favor the use of windmills, yet in peninsular India there are many localities where it ought to be quite profitable to make use of them. Generally speaking, the most suitable conditions for the use of windmills are along the seacoast from Karachi to Bombay and from Diamond Harbor to Negapatam, over a large tract of the Deccan, over the Mysore Plateau, and probably in most of the hill stations. The largest present use of windmills seems to be in the vicinity of Karachi and Bombay.

EXPERIMENTS BY DIRECTOR OF COMMERCE AND INDUSTRIES.

Mr. Chatterton not long ago purchased a windmill made in Chicago, for experimental use and making public for the farmers of southern India the results obtained. I have received from him a statement as follows concerning his views as resulting from these experiments and the field which may be open in India for the sale of American windmills:

I am of opinion that American windmills are not sufficiently strongly constructed for work in India. A good many minor breakages have occurred during the course of the experiments, but the most serious defects were due to the bad fitting of the valve in the pump chamber. The design seems to be excellent but the execution was bad and much trouble might have been obviated if the pivots on which the flap valves turn had been made larger and fitted into better designed sockets. A wind engine and pump can not be placed in inexperienced hands; they require careful looking after, and the slightest defect or damage should be remedied immediately it occurs. It will not pay to keep an experienced fitter to look after a single windmill, but the man could easily look after a dozen mills, and where such colonies of windmills can be established they should prove remunerative investments.

A 16-foot aeromotor mounted on a 40-foot tower and fitted with an 8-inch pump will cost, when erected over a well, about \$500, and we may assume that the cost of maintaining the same in good order will be about \$1.75 a month. Such investments should yield about 6 per cent interest on the capital expended, or \$2.50 a month. Ten per cent for depreciation is perhaps an excessive amount to allow, but it will be well on the safe side if we do so. This comes to \$4.16 a month, making the total cost of the windmill \$8.41 a month. Now, this windmill will do as much work as at least two pairs of good cattle, and if fitted with two pumps it will be equivalent to three pairs of cattle and the cost of lifting the water with them will amount to \$15 to \$22.33 a month, showing a margin in favor of the windmill of from \$6.66 to \$13.33 a month. This is the result that can be obtained in Madras, but there are thousands of square miles of country in India where much more favorable results can be obtained, and I therefore conclude that there is a wide field in India open for the profitable employment of windmills in lifting water for irrigation.

As an encouragement to American manufacturers of windmills I would lay stress on the much brighter prospects which now exist in India for the small farmers, through the operation of cooperative credit societies (a movement now making remarkable headway), and also through governmental loan assistance and help extended through various farm-implement depots established by governments of different Provinces to make important purchases of apparatus required for agricultural development, where previously, owing to individual poverty, this was quite impossible. Moreover, the areas open to irrigation and consequent possible use of windmills are constantly being increased through the construction of great government irrigation works. There is certainly, over important sections of India, an almost virgin field awaiting introduction of American windmills.

OIL ENGINES.

There is a market in India for small engines, principally internal-combustion engines, for ginning factories, paper mills, etc. In the agricultural districts there is an increasing demand for steam plows and traction engines, also for oil engines for irrigation purposes. The engine trade is largely confined to European or English firms, the latter having head offices in London, Leeds, and Wolverhampton, with branch offices in Bombay, Calcutta, and Madras. They have very few inland branches in India, but do their country business through commercial travelers.

The types of oil engines best known to the India trade—several of which use a heavy oil—include the Ruston Patent complete combustion crude-oil engine, 15-160 brake horsepower, made by Ruston Proctor & Co. (Ltd.); the Blackstone semi-Diesel engine, working on liquid fuel, manufactured by Blackstone & Co. (Ltd.); Tangye oil engine, working on kerosene; Crossley oil engine; Hornsby oil engine, working no kerosene or heavy oil, made by Hornsby & Son (Ltd.).

FUEL FOR ENGINES AND MOTOR CARS.

In connection with the trade in oil engines, American manufacturers who desire to cultivate a market here are often confused by the terms "crude oil" and "liquid fuel," which materials, they are told, are commonly used for operating oil engines in this country. The office of the Standard Oil Co. at Bombay has furnished the following information concerning the fuel used in the type of engines best known to the Indian trade:

The fuel oil most commonly used here for engines is not the same as crude oil from the wells. What is sold here as "crude oil" has had the kerosene removed, and is therefore treated to a certain extent after being taken from the wells. Some American dealers appear to think that "crude oil" here really means "kerosene," which is not the case. The Indian crude oil or liquid fuel is quite black, viscous, and heavy, with a specific gravity averaging 0.900 at 88° F.

For motor cars American gasoline is chiefly used, and is sold for about 71 cents for two 1-gallon tins. Kerosene or paraffin oil is obtainable throughout India. There are many different brands on the market, which are handled by the Standard Oil Co., of New York, the Asiatic Petroleum Co., the Burma Oil Co., and the Indo-Burma Petroleum Co.

LABOR-SAVING MACHINERY.

The Collector of Surat, Bombay Presidency, India, has issued a report drawing attention to the poor farming forced upon his district by labor difficulties, and suggesting that the only hope of improvement must rest in the general substitution of mechanical appliances for labor in the fields.

Mr. A. A. M. Green, I. C. S., assistant collector at Surat, has been at some pains to ascertain how far the state of affairs in his district has accelerated the tendency to employ machinery. He mentions the extended use of hay presses and the working of flour mills, and says the "rhonts," or water wheels, with metal buckets attached to an endless chain, have been purchased in increasing numbers, and the demand for them is so great that their manufacture has been begun in Bulsar. He says:

There are as many as 10 oil engines driving irrigation pumps. One of these has been working for three or four years at Pipalgarhan with great success. There are seven sharers in the concern, who provide the working expenses in proportion to the area of their irrigated land. Such cooperation is a most welcome sign, as it does away with uneconomic short-time working, which must always detract from the value of a power-driven pump that has only a small area to irrigate.

Wiser owners send a son or servant to Bombay to learn how to run their engines and how to effect minor repairs and have little trouble. A moderate number of iron plows are in use, but not much headway has yet been made with them. The old-fashioned wooden sugar-cane crusher has been almost universally superseded by iron machines.

The demand for small engines for irrigation purposes, and for working in sawmills, printing establishments, corn mills, sugar-cane crushing mills, rice mills, small foundries, and other small factories, is on the increase, and for agricultural purposes a growing interest is being aroused. The engine which is most desirable seems to be the oil engine from 3 horsepower up.

WELLS FOR IRRIGATION IN SOUTH INDIA.

[By Consul José de Olivares, Madras.]

Gratifying results in the improvement of farm lands were achieved through the combined efforts of the Madras Government and the numerous cooperative societies, which in recent years have come into existence. The most effective of these improvements were accomplished through the Pumping and Boring Department. During the year 25 new pumping installations and 24 new industrial installations were completed and 23 irrigation and 29 industrial plants were in course of construction. At the end of March, 1913, there were in various parts of the Madras Presidency 817 installations, 473 of which were used for irrigation and drive pumps. In all 539 borings were made, representing an aggregate of 20,423 feet and, notwithstanding that these were effected in most instances on semiarid lands, 62 per cent of the bore holes were successful.

One of the direct results of this practical reclamation work was an unprecedented demand for industrial machinery, 49 rice factories having been erected in a single district during the year. Every rural community where borings have been carried on to any considerable extent gives evidence of increased prosperity; and many small farmers, who formerly were obliged to seek employment away from their villages during the dry months, now find profitable employment on their own lands throughout the year.

DAIRY PRODUCTS.

BUTTER MAKING.

Although the most important milk product in India is ghee, or clarified butter, obtained chiefly from the milk of buffaloes, yet for butter itself, which is the first stage in the manufacture of ghee, there is a considerable demand, owing probably to the difficulty of obtaining pure ghee. In manufacturing ghee it is sterilized so that it keeps for long periods, and is thus more suitable than butter for the hot climate of India. However, it is so much adulterated with fats and oils and is so difficult to obtain pure that the European element, at least, prefers butter.

USE OF BUTTER AND CONDENSED MILK.

Inquiry in both Bombay and Calcutta indicates that the consumption of butter is largely restricted to the European community, and although large quantities are made in Bombay, mostly from cream imported by rail from the Ahmedabad and Surat districts, this is distributed over India for European use, or else exported to East Africa, and the Straits Settlements.

India also imports a fair amount of butter from Denmark, the United Kingdom, and France, in the order named. The total imports for the year ended March 31, 1914, amounted to approximately \$142,000, as against about \$117,000 for the preceding year. A large proportion of the butter thus imported comes in tins. The imports of butter are not nearly so important as those of condensed and preserved milk and cream, which amounted during the year 1913-14 to \$1,346,731, as against \$1,195,991 for the preceding year. Many Indians purchase condensed milk of European manufacture to feed their infants and children.

Butter will probably not displace ghee as an article of consumption by Indians for various reasons: (1) The inherent keeping capacity of ghee due to the prolonged high temperature employed in its manufacture; (2) the ready adjustment of the market price of ghee to the requirements for various grades, by adulteration with sesame, oil, coconut oil, and animal fat; (3) the prejudice against butter as an article manufactured under conditions that may have brought it under the ban of religion or caste. It appears, however, that there is a growing demand for butter among Indians, not for consumption as such, but to be used for the manufacture of ghee.

SEPARATION OF CREAM.

A dairy expert of the Government Agricultural Research Institute at Pusa, India, states that tinned butter is now largely produced in Gujarat (Bombay Presidency). Despite the absence of a ready market for separated milk, trade in tinned butter has developed considerably and the product is used in India, Burma, and the Straits

Settlements. The introduction of the cream separator some years ago has greatly aided the development of this industry. The cream is separated in the villages and sent to large centers like Bombay and Ahmedabad, where the butter is made and tinned. At Bombay the cream ripens on the way and is ready for churning on arrival. The whole process is carried out under insanitary conditions. Still the trade is firmly established and its success is a testimony to the value of an efficient piece of dairy machinery where conditions demand rapidity in handling the produce.

In both ghee and butter making in India the use of cream separators ought to be of advantage, owing to the superiority of separated over skimmed milk.

ENGLISH CONCERN INTRODUCES SEPARATORS.

About 25 years ago the late Sir George Barham, at that time proprietor of the Dairy Supply Co. (Ltd.), of London, sent to India a commission to report on the possibilities of the dairy industry of India, and especially to investigate the feasibility of using cream separators and other dairy machines and appliances in connection with the production of cream, butter, ghee, and other dairy produce. Several years afterwards there was established under the auspices of this concern (the Bombay Dairy Supply Co.), in Bombay, the first working dairy in India. The company has since supplied a large number of cream separators to India of the Alfa Laval type.

The commission mentioned had the cooperation of the Bombay Government to "ascertain by trial whether the cream separator is needed in India, and whether it can be profitably utilized in the manufacture of ghee." After an extended tour in several provinces, and after having made various trials, the following conclusions were published:

1. Tak, a by-product of ghee making, can be prepared perfectly well from separated milk.
2. Mawa, or khowa, which consists of desiccated milk sweetened with sugar, can be made from separated milk, and the cream saved for butter or ghee.
3. As much ghee can be made from separated cream as by the native process.

In discussing the introduction of the cream separator into India, which followed the visit of this commission to India, the book "Commercial Products of India," by Sir George Watt (published in 1908), said:

There are many designs or patterns of separators, but the principle is the same in all. They take advantage of the fact that cream, or butter fat, is lighter than milk. By centrifugal force the liquid revolving within a cylinder at once, therefore, separates into cream in the middle and milk on the outside, and these two portions are conveyed away by separate pipes into the vessels placed for their reception. The milk can be separated immediately on its being taken from the cow. It is not required to be exposed in a large number of shallow basins; the milk as drawn from the cow may at once be placed in the separator. By a hand separator from 30 to 40 gallons may be disposed of per hour. Obviously such results and advantages were of interest to every one in India, and it is no matter for surprise, therefore, that the new system attained almost immediate popularity. In June, 1890, the late Mr. Ozanne, then Commissioner of Settlements and Agriculture, Bombay, obtained permission to employ a European expert and to purchase two separators. In a remarkably short time dairies, managed on the European system, sprang into existence here and there all over India. The fact that two products were obtained—(a) butter (ghee) and (b) milk from which mawa could be manufactured—was sufficient justification. All the larger towns of India are now rapidly being supplied with superior butter, also with sterilized

milk and cream, conveyed in sealed cans or bottles. As might have been anticipated, however, the greatest progress has been made in the Bombay Presidency, where the experiment originated.

REPORTS FROM OTHER CONSULAR OFFICERS.

With reference to the sale of cream separators in other parts of India than Bombay and in Ceylon, I have obtained the following information from other consular officers:

Vice Consul General Charles B. Perry, Calcutta: With regard to the market for cream separators in this district, there is a very limited demand. The custom prevails among the better class of residents of purchasing milk at their own door, the cows being driven along and milked in the presence of the purchaser of the article to avoid excessive adulteration. A few cream separators are, however, kept in stock by such firms as T. E. Thompson & Co. and W. Leslie & Co. The Aligarh Dairy Co., also located in Calcutta, makes use, I am told, of a number of cream separators, and, as far as I can ascertain, is about the only reputable dairy in this city.

Consul José de Olivares, Madras: The use of cream separators in this part of India is extremely limited, being restricted to only a few of the larger dairy establishments. Owing to scarcity of proper feed for milch cattle in the more populous centers, most of the milk produced in this section is capable of yielding a very small percentage of cream, and for this reason very little butter is manufactured hereabouts. The proper firms to address on the subject of introducing cream separators into this district would be the leading dealers in hardware and agricultural implements in southern India, a list of which is on file in the Bureau of Foreign and Domestic Commerce, Washington, D. C.

Vice Consul H. B. Osborn, Rangoon, Burma: There are no large dairy farms in Burma. Rangoon receives its fresh milk supply from small dairymen, owners in each instance of probably a half dozen cattle. Messrs. D. Barn & Co., Sule Pagoda Road, Rangoon, dispose of a quantity of sterilized milk and are really the only capitalist milk dealers in this Province. A total of \$647,000 of tinned milk (mostly condensed "Nestle" and "Anglo Swiss") was imported into Rangoon during 1912. There are no dealers who handle cream separators or other dairy appliances in Burma.

Consul Charles K. Moser, Colombo: There is an exceedingly limited market here for cream separators, as there is practically little fresh butter produced for European consumption, and nearly all that is produced is made by the old-fashioned churning process. Most of the butter used by Europeans is imported from Australia or Denmark. The natives use largely rancid butter or ghee from India. There is a scattered demand, however, for cream separators on various up-country estates.

MILITARY DAIRY FARMS.

The military dairy farms in India are now furnishing interesting illustrations of what may be done to get a supply of wholesome milk. Every regiment in the British Army in India has its own dairy farm from which milk, cream, and butter are supplied, not only to officers and soldiers of the army, but also to their families. The cows are carefully selected and kept in clean surroundings, and persons experienced in sanitary dairying are in charge. There has been a considerable outlay on buildings and dairy machinery. The products are delivered in army wagons in which soldiers are always on guard duty, in order to prevent irresponsible native drivers from stealing or adulterating the milk.

These military dairy farms, together with the practice of inoculation, have undoubtedly been the means of greatly lessening the prevalence of typhoid or enteric fever among officers, soldiers, and their families. Among the European troops the sick rate for typhoid or enteric fever has dropped from 20 per 1,000 in 1863 to 2 per 1,000 in 1912, and the death rate from 5.6 per 1,000 in 1863 to 0.4 per 1,000 in 1912. There have also been great reductions recently in the sickness and mortality from cholera, dysentery, and other diseases con-

tracted through impurities in food and drink. In 1912 there were 71,000 European troops and officers in India, and with them were 4,248 women and 7,046 children. The health of the women seems never to have been so good as that of the men, but the constantly sick rate for women dropped from 32 per 1,000 in 1863 to 21 per 1,000 in 1912. Their death rate is now 9 per 1,000 as compared with 44 in 1863. As regards children, the death rate, which in 1863 was 90 per 1,000, was 33 in 1912. Of each 1,000 infants under 6 months of age in 1863, 301 died annually, and of those from 6 to 12 months of age 235 died per 1,000. These rates continued until about 1880. While it is still unsatisfactory, the mortality now stands at 142 per 1,000 for infants under 6 months of age and 73 for those between 6 and 12 months. As regards Indian troops, the mortality shows an improvement of about 46 per cent over that of 1863, as compared with 82 per cent among the European troops.

CREAM SEPARATORS.

The following information was obtained from Lieut. Col. F. W. Hallowes, Director of Military Farms for the Quartermaster General in India, at Simla:

The military dairy farms in India are not dairies managed by the regimental authorities, but are dairies controlled by the military farms department.

The cream separators used are mostly of the "Alfa Laval" type, fitted for driving with belt power, with fast and loose pulleys. They vary in capacity from 90 (hand power) to 440 (belt driven) gallons per hour and in price from £28 to £86 (\$136.26 to \$418.52). They are supplied through the Director General of Stores, India Office [London] on indents preferred by the military farms department.

CANNED-MILK ADVERTISING.

The awakening popular recognition of the unsatisfactory and dangerous ordinary natural milk supplies in India has recently been causing a large increase in importations of foreign condensed and sterilized milk. The imports of such milk (under the heading of condensed and preserved, including milk cream) increased from 9,198,428 pounds valued at \$831,106 in 1909-10, to 14,681,229 pounds valued at \$1,346,731 in 1913-14.

The following statement shows the quantity and value of condensed and preserved milk shipped into India by each of the principal countries participating in this trade in 1912-13 and 1913-14.

Countries.	1912-13		1913-14	
	Pounds.	Value.	Pounds.	Value.
United Kingdom.....	6,823,239	\$807,007	6,182,299	\$779,969
Norway.....	442,666	25,958	265,430	20,420
Germany.....	1,094,845	69,445	1,600,578	109,564
Netherlands.....	2,743,016	175,257	5,076,556	317,953
Belgium.....	942,244	58,928	1,004,141	71,372
Switzerland.....	514,344	40,956	211,207	20,123
Italy.....	108,354	7,314	85,199	6,653
Austria-Hungary.....	82,768	4,755	81,660	4,964
United States.....	22,978	2,000	45,124	3,848
All other countries.....	42,458	4,371	139,035	12,375
Total.....	12,816,910	1,195,991	14,681,229	1,346,731

One well-known company (the Nestle & Anglo-Swiss Condensed Milk Co.) has lately been undertaking the most extensive advertising campaign in India of any foreign company engaged in business in this Empire. Every two or three days during several months the leading newspapers of India have had full or half page advertisements of its "Milkmaid" sterilized natural milk. It is said that in response to this advertising campaign the company's sales in India are rapidly increasing. Shipments of this milk are received in India in tins, fresh every two weeks.

This company has also made arrangements with cinematograph shows in India to use films portraying the insanitary method of dairying in India and also the adulterations which take place, as compared with the wholesome production of milk in such countries as Switzerland and Norway. Furthermore, to stimulate interest in its sales, the company puts in occasional tins 100-rupee notes (about \$32.50 each) and extensively advertises the chance of finding such hidden treasure. Tins of this sterilized natural milk are sold at Bombay, Madras, and Karachi, the 19-ounce size for about 90 cents per dozen, or 8 cents each, and the 7½-ounce size for 48 cents per dozen tins, or 4 cents each. In country districts the price is one-half to 1 cent higher per can.

BURMA'S TRADE IN CONDENSED MILK.

[By Consul Maxwell K. Moorhead, Rangoon.]

According to the chief collector of customs at Rangoon, 63 per cent of the condensed and preserved milk imported into British India during the year ended March 31, 1914, was imported for consumption in the Province of Burma, although the proportion of the population of Burma to the combined population of the Indian Peninsula and Burma is but 3.8 per cent. Burma is thus by far the largest consumer of imported condensed milk of all the Provinces of India. This is due partly to the fact that the Burmese hardly ever go in for dairying. Milk is produced locally by cows and buffalos kept by Indian emigrants, but this milk is very poor in quality and kept in so unsanitary a condition and is so frequently mixed with impure water that the Burmese and Europeans prefer the canned imported milk. There are no statistics available showing the amount of milk produced in Burma.

IMPORTS BY COUNTRIES.

The imports of preserved and condensed milk into Burma during each of the five years ended March 31, 1910 to 1914, by principal countries, are given in the following table:

Countries.	1910	1911	1912	1913	1914
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
United Kingdom.....	3,751,318	4,018,670	3,992,109	3,703,915	3,334,596
Netherlands.....	1,013,602	966,883	1,211,997	2,084,365	3,744,799
Germany.....	514,231	567,130	854,631	865,022	1,153,104
Belgium.....	30,123	1,392	6,000	728,056	640,184
Norway.....		12,508	41,364	408,704	162,598
Austria.....	183,523	105,864	127,884	70,640	86,860
Switzerland.....	1,440	6,000	171,680	347,876	58,072
United States.....	19,203	42,977	24,461	21,947	44,801
All other countries.....	17,120	137,328	294,714	28,455	81,990
Total.....	5,530,566	5,858,752	6,724,840	8,259,070	9,307,004
Total value.....	\$464,070	\$445,240	\$573,650	\$698,050	\$802,880

The greater part of the imported milk trade in Burma is in the hands of the Nestles and Anglo-Swiss Condensed Milk Co. Their "Milkmaid Brand" has been so extensively advertised that it is well known in every village of Burma. This company maintains a wholesale office and warehouse in Rangoon. By means of frequent shipments and stocks continually on hand, the retail dealers are never without supplies. Extensive advertising is made in the local newspapers, on programs of the theaters, and in motion-picture houses. Travelers are sent out through the districts with hand-worked motion-picture machines, illustrating the process of its manufacture. By this means the brand is continually kept before the people.

A brand of American milk, well known in the United States, is sold in Rangoon by a wholesale trading company, but it has never, to my knowledge, been advertised in Burma. The result is that this milk is unknown except to the American community. American manufacturers must never expect to get a fair share of the imported-milk trade unless they advertise extensively. Burma is a large and growing market for condensed milk. There is no better milk in the world than that produced in the United States, but the milk will not sell itself. The manufacturer must use the same methods abroad as he does at home.

VEGETABLE OILS.

The Department of Commercial Intelligence of the Government of India, in a bulletin on vegetable oils and oilseeds produced in the country, states that a large proportion of the oilseeds produced in India is exported in normal years to the countries now involved in the European war. The closing of these markets has caused a serious situation already in copra and peanuts (groundnuts) and will be felt later in oilseeds which are harvested in the spring. The export of cotton seed, which goes to the United Kingdom, should not be affected to the same extent.

OILSEEDS EXPORTED MORE THAN OILS.

The figures of India's export trade in oilseeds and oils which are given below illustrate the importance of India's export of oilseeds and its dependence upon markets now closed to it. They also emphasize strongly the smallness of India's export of oils compared with its export of oilseeds. The possibility of avoiding this economic loss by crushing a larger proportion of the oilseeds in India both for local use and for export is discussed in the bulletin, and some of the factors which tend to impose limitation on the development of the Indian oil-milling industry are indicated.

The value of nonessential oilseeds exported from India during the last two fiscal years ended March 31 totaled as follows:

Oilseeds.	1912-13	1913-14	Oilseeds.	1912-13	1913-14
Linseed.....	\$25,845,480	\$21,685,880	Mahua seed.....	\$694,980	\$1,769,040
Peanuts.....	13,092,840	15,814,440	Poppy seed.....	1,803,060	1,506,800
Rape seed.....	11,678,580	13,860,720	Mustard seed.....	206,460	345,060
Sesame (gingal).....	5,909,780	8,728,560	Niger seed.....	281,880	208,980
Cotton seed.....	3,329,100	6,894,580	All other.....	592,920	281,880
Castor beans.....	5,307,120	6,497,820	Total.....	73,006,920	82,627,960
Copra (coconut kernel)....	4,174,740	5,054,400			

THE COUNTRIES THAT BUY INDIA'S OILSEEDS.

Out of this total of \$82,620,000, upward of \$55,000,000 represent exports of oilseeds to France, Belgium, Germany, and Austria-Hungary. The values of the exports taken by the various countries in the order of their importance are: France, \$26,132,220; the United Kingdom, \$18,438,840; Belgium, \$13,350,420; Germany, \$13,228,920; Italy, \$4,165,020; Austria-Hungary, \$2,813,940; the United States, \$996,300; Russia, \$592,920.

The different classes of seeds go chiefly to the following countries: Linseed to the United Kingdom, France, Germany, Belgium, Italy, the Netherlands, and Austria-Hungary; peanuts to France, Germany, Austria-Hungary, and Hongkong; rapeseed to Belgium, Ger-

many, France, the United Kingdom, Italy, and Austria-Hungary; sesame (gingeli) to Belgium, France, Austria-Hungary, Germany, and Italy; cotton seed to the United Kingdom; castor beans to the United Kingdom, France, United States, Belgium, Italy, and Germany; copra to Germany, Belgium, Russia, and France; mahwa seed to Germany and Belgium; poppy seed to France, Belgium, and Germany; mustard seed to France and Belgium; niger seed to Germany and France.

EXPORTS OF VEGETABLE OILS AND OIL CAKES.

Compared with this great volume of exports of oilseeds, India's exports of vegetable oils and oil cakes are relatively small. The figures are as follows:

Oils and cakes.	1912-13	1913-14	Oils and cakes.	1912-13	1913-14
VEGETABLE OILS.					
Coconut.....	\$627,042	\$753,654	Linseed, rape, and sesame..	\$2,052,305	\$2,638,187
Castor.....	438,784	449,569	Peanut.....	1,287,770	1,273,179
Mustard and rape.....	250,552	236,312	Cotton seed.....	173,881	234,043
Peanut.....	112,445	145,863	Coconut.....	201,510	131,049
Sesame.....	98,925	139,477	Castor.....	128,488	94,211
Linseed.....	101,199	85,015	All other.....	147,978	101,741
Cotton seed.....	1,545	4,116	Total.....	3,991,932	4,472,410
All other.....	19,162	60,267			
Total.....	1,649,654	1,874,273			

OILS MANUFACTURED BY CRUDE PROCESSES.

It has often been pointed out that it is both economically and industrially unsound for India to export oilseeds instead of manufacturing the oils and oil cakes in India. An immense quantity of oil is, as a matter of fact, already manufactured in that country by more or less crude processes. Village oil mills worked by bullocks and presses worked by hand exist in all parts of the country and supply most of the local demand for oil. There has also been a great increase in recent years in the number of oil mills worked by steam or other mechanical power. These crush all the commoner oilseeds, and development has been especially marked in the case of mustard oil, castor oil, and peanut oil. Castor-oil mills have been working successfully in Bombay, the Punjab, the United Provinces, and elsewhere. Mustard-oil manufacture is a flourishing industry in Bengal; coconut-oil mills have been established in considerable numbers on the Malabar coast and in Cochin, and peanut-oil mills in Bombay.

Some of the larger mills deal with a great variety of seeds; for instance, the Punjab Oil & Flour Mills crush linseed, rapeseed, sesame seed, mahwa seed, cotton seed, and castor beans. Nevertheless, there is a perceptible diminution in the export of oils from India, particularly of coconut and linseed oil, and an increase in the export of oilseeds, which is particularly marked in the case of copra and peanuts. The situation created by the war has naturally led to much discussion of the possibility of developing on a large scale the existing oil-milling industry in Delhi.

EUROPEAN TARIFFS AND OTHER HINDRANCES TO OIL MILLING.

Three difficulties confront any proposal to develop in India an oil-milling industry on a great scale. In the first place, there exist high protective tariffs in European countries which encourage the export from India of the raw material rather than the manufactured product. Secondly, there is a better market for the oil cake in Europe than in India, and the freight on oilseeds is less than the freight on cake. Thirdly, it is much easier and less expensive to transport oilseeds in bulk than to transport oil. Oilseeds can be packed in bags or carried in bulk, whereas oil requires expensive casks, drums, or tins. If casks or drums are used, the expense is prohibitive unless a return load can be obtained, and the export of oil for some time could not be expected to be on such a scale that carriage in bulk in tank steamers would be feasible.

These three considerations naturally tend to encourage the export of oilseeds and to discourage the export of oil. More serious still is the problem of finding markets for the oils and for the oil cake which would be produced by an industry on the scale suggested.

LINSEED OIL IMPORTED—USES OF INDIAN OILS.

Locally-made oils already supply most of the Indian demand, and foreign oils are not largely imported, with the exception of linseed oil, of which \$285,850 worth was imported in 1913–14. Indian linseed oil, which is now made by several mills of a quality not inferior to the best imported linseed oil, may be expected to take the place of foreign linseed oil in the Indian market. The oils have a great variety of uses in Europe: For mixing with other edible oils, for cooking, illumination, lubrication of machinery, etc., and as materials in a great variety of industries, such as soap, candle, and paint manufactures, the manufacture of coconut butter from coconut oil, and margarin from cottonseed oil. In India also the uses are various and the demand large. The local demand also is undoubtedly increasing and may be expected to increase proportionately with the industrial development of the country, which will stimulate the demand for vegetable oil as a lubricant for machinery and as a raw material in such industries as soap manufacturing. At the same time it must be noted that cheap mineral oils have, to a great extent, supplanted vegetable oils as illuminants. The Indian market, therefore, for vegetable oils, though large, does not admit of indefinite expansion; for an industry on a great scale other markets also will have to be secured.

TEMPORARY OPENING FOR INDIAN OILS IN EUROPE.

Hitherto Indian oil manufacturers have not been able to secure any market in Europe, and the Director of Commercial Intelligence says that no such market will be easily won or easily retained, and that any attempt to capture European markets has to face the competition of the great European refineries at such places as Marseille. However, a temporary opening no doubt exists, by reason of the cessation of work in most European mills. He states that if the difficulty of carriage could be overcome and if a high class of refined oil were maintained, there would seem to be a possibility of

India supplying the United Kingdom with some of the oil, at any rate, which it imports from the Continent. For instance, last year the United Kingdom imported from Germany \$4,174,740 worth of unrefined and \$2,532,060 worth of refined coconut oil. Considering that the greater part of the raw material (copra) exported from India goes to Germany, it may be assumed that large quantities of the coconut oil imported into the United Kingdom from Germany is made of Indian copra. Again, the United Kingdom imported last year \$155,520 worth of castor oil, mainly from Belgium and France; \$296,460 worth of linseed oil from Belgium and \$140,940 from Germany; \$228,420 worth of rapeseed oil from Germany and \$270,216 worth from Belgium.

UNITED STATES THE PRINCIPAL BUYER OF COCONUT OIL.

The exports of coconut oil from India in 1913-14 were: To the United States, \$306,520; the United Kingdom, \$154,348; Germany, \$111,085; Sweden, \$82,600; Belgium, \$30,190. It is noticeable that whereas the exports to the United States and the United Kingdom show no falling off compared with previous years, the exports to Germany and Belgium in 1909-10 were \$478,933 and \$201,437, respectively. Germany and Belgium have been taking more and more of the raw material and less and less of the manufactured product.

EXPORT OF OIL CAKES INCREASING.

The problem of finding a market for oil cakes is equally important. The value of oil cakes is much better appreciated in Europe than in India, and the increase in exports has already been noted. The Indian cultivator is prejudiced against the use of machine-made cake as a cattle food or as manure because he considers that it contains less oil, and therefore less nourishment, than the village-made cake. He is therefore unwilling to buy it except at a reduced price. His prejudices on this point have no justification in fact, since all experts are agreed that mill cake is a better food for cattle than village-made cake. Even when the mill product contains less oil than the village cake, there is still more oil in the cake than cattle can digest.

The excess of oil in the village cake, where it exists, is a drawback and not an advantage to the use of the cake as food. A considerable amount of demonstration work has been done by the agricultural departments of governments in India in order to remove the cultivator's prejudices, and there is said now to be an increasing demand for most classes of mill cake. Sesame cake is in special demand, and there is an improving market for peanut cake and mustard cake. The cultivators in the sugar-cane irrigation tracts of the Deccan are said to buy readily the castor cake manufactured in the Bombay mills and have even bought castor cake from the mills at Lahore. On the other hand, the difficulty of disposing of the cottonseed cake at remunerative rates was one of the principal causes of the failure of the earlier cottonseed-oil mills. The difficulty of finding a market for oil cake is one which, without doubt, will gradually be solved by the education of the Indian cultivator, but at present it imposes a practical restriction on the rate of development of the industry.

TIL OR SESAME.

A til seed crop 90 per cent of the normal is expected in Rajputana and the United Provinces. Til is the local name for gingeli seed (*Sesamum indicum*). This year's area is estimated at 359,000 acres, as against 378,750 acres last year. This is a decrease of about 5 per cent. The decrease was caused by excessive rainfall in the early sowing season. Til is used for making a light oil.

PRODUCTION AND USES OF COTTON SEED.

India's export of cotton seed to the United Kingdom and the continent of Europe varies every year according to the amount which may be available for export after making provision for feeding the cattle in India. If there is a good monsoon, so that grass and other feed for cattle are in plentiful supply, perhaps one-half of the cotton seed grown may be exported. When, however, there is any failure in the monsoon, the Indian farmers are averse to selling their cotton seed for export, but hold it over for winter feed for cattle. In general, however, the production of cotton seed for export has shown a large increase in recent years in connection with the rapid development of India's cotton-growing and manufacturing industries. The export, however, may frequently represent, especially in very dry years, as explained, but a small proportion of the amount of seed available.

In 1898-99 the exports of cotton seed were 1,850 tons, in 1901-2 they rose to 11,250 tons, in 1906-7 to 219,379 tons, and in 1913-14 to 214,326 tons, valued at \$6,894,580.

PERCENTAGE OF LINT AND OIL.

Indian cotton as picked yields about 30 per cent lint and 70 per cent seed. As ginned, the percentage of lint adhering to Indian seed is from about 2 to 4 per cent of the whole weight. The oil has been estimated in several samples of Indian seeds with the following results: The average of those from the Madras Presidency gave 17.41 per cent; Bombay Presidency, 17.66 per cent; Central Provinces, 19.65 per cent; and United Provinces, 19.89 per cent. The variation in individual samples was small, from 15 to 21 per cent in extreme cases. The amount of oil contained in Indian seed is much less than in American, which contains upward of 30 per cent. The Indian seed is also smaller. Specimens of American weighed 12 to 18 grams per 100 seeds and Egyptian 10 to 11 grams, while Indian seed weighed only 5 to 7 grams.

In the United Kingdom, which furnishes the chief market for Indian cotton seed, it is not the usual practice either to delint or to decorticate it before crushing. It is merely freed of foreign substances of a kind injurious to machinery, such as stones and scraps of iron, and is further cleaned when it is found to contain an excessive quantity of sand. The hulls with the adherent lint represent not only one-half of the total weight of seed, but nearly 22 per cent of its total nutrient value as cattle feed. Practically it may be taken that Indian seed contains 18 per cent of oil, and this percentage is generally assumed by the trade in the United Kingdom. A certain quantity of the

oil in the seed is not extractable by ordinary pressure processes, but remains in the cake and meal. It constitutes part of their value as cattle feed, but not as manure. The result of feeding tests made in England with Indian decorticated and undecorticated cake have shown that decortication was unprofitable, also that the husk of Indian seed is so thin as to cause no digestive trouble.

MOLDY SHIPMENTS—SELECTED SEED FOR SOWING.

With reference to complaints as to moldiness of Indian cottonseed cakes on arriving at European destinations, the Bombay Agricultural Chemist states that this is principally due to the large quantity of moisture the cake contains, and hence if it is to be avoided the cake will have to be packed dry and carefully bagged.

For their own seeding supply cotton seed is seldom preserved by the Indian farmers. It is bought at about the sowing time, directly or indirectly, from a ginning factory. The factory managers do not take any special care to prevent the mixing of the seeds of different varieties of cotton. But if they be approached with a sufficiently large quantity of seed cotton to be ginned, they seem to be willing to gin this separately and keep the seed free from actual adulteration with other types of cotton. A method of producing better cotton seed in one of the leading villages of the Bombay Presidency is thus described in a recent bulletin issued by the Department of Agriculture, Bombay:

Each farmer in the village picks the best bolls of the seed cotton from his farm and adds it to the lot similarly picked by the other farmers of the village. The whole lot is then ginned separately in a local factory, the manager of which has arranged to return the seed to the farmers without allowing it to be mixed with any other seed. This is only possible because the total quantity supplied for this purpose by the cooperation of the villagers is large enough to justify this care on the part of the gin owner. The seed after ginning is then divided among the farmers according to their share of the seed cotton, and this seed alone is used for the next year's sowing.

This system has been practiced only for the last three or four years, but the general improvement in the quality as well as the yield of the seed cotton from this village has already begun to show itself, and during the season of 1910 the cultivators themselves estimated their profit at about 5 per cent above that gained by others who had simply obtained their cotton seed in the ordinary way. This seems a simple method of maintaining the purity of the seed. But entirely apart from this, the factory-ginned seed is greatly damaged during the ginning, and a large percentage of this seed is hence useless for sowing.

This bulletin further states that while hand-ginned seed would be the best for sowing purposes, if care were taken to leave as little lint with the seed as possible, yet it is out of the question on account of the time, cost, and amount of labor involved to get a sufficiently large quantity of such seed. Factory-ginned seed could be improved in quality if it were given a finish by means of some sort of machine which would separate the heavier seeds from the lighter and damaged ones.

CLEANING THE SEED FOR PLANTING.

The usual method employed by an Indian cultivator for cleaning and separating the heavier from the lighter seed and other impurities is simple. The seed is put in a "sup," which is a bamboo winnowing scoop, and it is poured from a suitably high level, so that big plump grains fall on the ground near the feet of the man pouring the grain,

while the lighter grain and the chaff are blown apart by the wind. If the draft be not sufficiently strong to clean the grain properly, a thick sheet of cotton cloth is held by three persons to make it into a sort of a fan and moved up and down to create a strong draft. A woman with a brush prevents the three things thus separated, namely, big plump grains, lighter grains, and the chaff, from mixing with each other during the cleaning operation. Particles of clay and sand and seeds of other grains are separated by means of coarse hand sieves and bamboo winnowing scoops.

Such simple implements are quite sufficient to clean the ordinary farm grains with smooth seed coats, but they fail to separate heavy and plump seeds of cotton from the lighter and damaged ones, owing to the dense fuzz existing on the cotton seeds which hold them together. Some sort of device has therefore to be applied to cement this fuzz before any separation could be possible. The farmers try to paste this fuzz down in preparing the seed for sowing in the following manner:

The seed is mixed with a thin plaster of cow dung, mud, and water, and the plastered seed is then rubbed on the close network of a "charpai" (country bedstead) or sometimes on the hard floor of the barn. This treatment separates the seeds from one another and makes it possible to pass them, when dry, through the seed bowl and tubes of an ordinary country seed drill. But the fuzz thus cemented by means of cow-dung plaster remains so only for a short time. As soon as the seeds get quite dry, if handled a bit roughly, the plaster begins to fall off and the fuzzy hairs on the seeds straighten out and the seeds have a tendency to cling together. The farmer is hence obliged to sow the seed thus prepared while still damp. Such prepared seed can not be preserved for any length of time. The sowing has to be done before the plaster falls off, and this happens soon.

GOVERNMENT SEED PREPARATION EXPERIMENTS.

In view of these difficulties, the Bombay Government's agricultural farm at Poona has been experimenting with an American method of cementing the fuzz of the cotton seeds with paste made out of wheat flour, and has found it successful. By this method the fuzz remains cemented permanently until the seed is moistened or soaked in water, and the paste in no way interferes with its use in feeding or for other purposes later on.

The bulletin issued by the Bombay Agricultural Department states that the necessary apparatus for this American plan for rolling the seeds to paste the fuzz down with flour paste can be provided at small cost. The one used in the experiments at Poona consists of a wooden cement barrel, fitted with a wooden axle extending through its center, supported at each end, and having a crank attached at one end for turning. It has an opening at one side through which the seeds can be put in or taken out and which is closed during the rolling process by a hinged door. The rolling and separation of the seed can be done by this method at any spare time of the year when there is an abundance of labor. The seed treated by the paste method is dried before separation, so that the element of error is reduced.

As the ordinary machines used in India for separating seed grains with smooth seed coats fail to separate the heavier and plumper cotton seed from the lighter and damaged ones, the agricultural farm at

Poona has prepared for experiment a winnowing machine to meet these requirements. A long narrow hole about 4 inches wide was cut through the center of an ordinary winnowing machine, and a flue was erected on it to direct the current of air raised by working the fans. The tube was made in sections to regulate the length of the flue as required for the best results. The gearing was also changed so that the fans could be run fast, while the frame holding the screens vibrated slowly. The time required to pass the seed through the separator for an efficient separation is about one minute per pound of seed. This involves about 240 to 250 revolutions of the fans per minute. It takes thus about half an hour on the whole to prepare and separate seed sufficient to sow an acre of land. The cost of such a machine is estimated at about \$15.

GERMINATING POWER—SEED CLEANERS.

The conclusions arrived at from separation of the different types of cotton seed grown in the Bombay presidency have been summarized as follows by the Bombay Department of Agriculture:

The ordinary cotton seed used by the cultivator for sowing purposes is of very low quality, and the proportion capable of germination is very small. There is a decided improvement made in the germinating power of a sample of seed by separating the heavy and sound seeds from the light and damaged ones. The ordinary implements used for separating the heavier from the lighter seeds in the case of smooth-coated grains like wheat or jowar are of little avail for cotton seed, owing to the presence of a dense fuzz on this seed which makes it cling together in big locks. It is therefore necessary to cement the fuzz on the seed by some means before any separation could be attempted, and the ordinary winnowing machine requires to be modified before it can be used as a separator for cotton seed. The fuzz on the cotton seed can be very easily cemented by rolling the seed with flour paste. It is thus possible to prepare the seed for separation at little cost. The germination percentage of cotton seed is increased by from 8 to 35 per cent, in various cases, according to the quality of the original sample of seed, by passing it through the separator.

The leading cottonseed export merchants of Bombay are also obliged to use seed-cleaning machines in order to keep down the percentage of dirt as required by their customers. These machines run the seed down an inclined sieve, and those I saw working at one big export warehouse at Bombay appeared to get rid of an immense amount of rubbish. However, it is said that none of these machines can do the work as thoroughly as will be required by the new contract regulations of the Incorporated Oilseed Association of England, and it is stated that the various kinds of rubbish that must be dealt with, as well as the frequent moist condition of the seed which makes dirt cling to it, renders the cleaning problem a very difficult one.

EXPORT CONSIDERATIONS.

The cottonseed trade of the world asks why India exports such a comparatively small part of its cotton seed, in view of the favorable average prices which could be obtained for it in England and Europe. One English trade journal recently mentioned that while India's cotton crop on the average is one-third to one-half of the American crop—on the same basis India ought to be able to export nearly 800,000 tons of seed—yet the highest imports recorded fall short of less than half this amount. This trade journal suggested that the

Indian farmers do not understand the value of their cotton seed or they would export more. However, it must be obvious to persons conversant with the trade here that Indian farmers if they could always be assured good monsoons, such as would insure sufficient growth of all the fodder necessary for support of their cattle, might sell much larger quantities of cotton seed for export. However, monsoon conditions are always uncertain, so that large proportions of cotton seed are held in reserve for cattle feeding. The large proportion of dirt in Indian cotton seed also lessens its export value; but no matter how much dirt it contains the Indian cattle will eat it when no other fodder is available.

INDIA A POSSIBLE MARKET FOR AMERICAN COTTONSEED OIL.

In response to several inquiries of American cottonseed-oil firms, I have been investigating the possibility of successfully introducing American cottonseed oil into India. It would be difficult to form any final conclusions concerning this important matter without being provided with data from American manufacturers themselves as to the cost of producing such oil in the United States and selling it in India in competition with local vegetable oils, and ascertaining whether or not they would be willing to go to some expense to experiment with the Indian market and overcome possible prejudices. However, from a general observation of the existing situation in India, it would seem clear that if American cottonseed oil, with a certain amount of initial pushing, could gain a footing here, the prospects for an ultimate enormous and profitable business would be most promising. It is evident that if American cottonseed oil, either as now sold in other countries or else mixed with a certain amount of other vegetable substances, could be used as a satisfactory substitute for native ghee or clarified butter, then India might prove an almost unlimited market for this important American product.

FEATURES FAVORABLE TO AMERICAN TRADE.

It seems obvious that there is an increasing need in India for a cheap and satisfactory substitute for ghee, so that the present time seems very opportune for American manufacturers of cottonseed oil to give this matter their attention, and perhaps send experts here to investigate the situation thoroughly in all its commercial aspects. Although it might seem almost an absurdity that India, which exports enormous quantities of cotton seed to Europe every year, besides using an immense amount at home for feeding to cattle, should ever become a large importer of cottonseed oil, nevertheless it is doubtful if for a long time to come this country could develop the industrial efficiency to manufacture successfully on a great scale a satisfactory substitute for ghee from its own cotton seed. Moreover the difficulties connected with a cottonseed-oil industry in India itself would probably always be greater than those that attend such industry in the United States, mainly because the Indian seed is not so satisfactory to work with.

AMERICAN AND INDIAN SEED.

In 1907 Mr. R. C. Whitenack, an American citizen who was formerly economic adviser to the Government of the State of Baroda, made some investigations to test the comparative merits of Indian

and American seed. He reported that the Indian seed is smaller and fuzzier, and therefore more difficult to manipulate. The percentage of oil was found to be lighter and that of hulls heavier. From the Department of Commerce, at Washington, he was furnished with the following analysis of average results obtained from Indian seed and from American seed:

Items.	American.	Indian.
Weight of seed.....	grains..	4.5
Percentage of meats.....	55.0	45.0
Percentage of hulls.....	45.0	55.0
Percentage of oil in meats.....	21.4	18.0

In the actual extraction of oil from seed American manufacturers also have the advantage of operating with greater economy than would probably be possible for a long time in India, as they are thoroughly experienced, use up-to-date machinery, which they fully understand, and carry on the industry on the big scale necessary to produce the best financial results.

PREVIOUS REPORTS ON COTTON SEED AND PRODUCTS IN INDIA.

The opinion is growing in India to the effect that considerable economic good might be brought about through the development of mills to make use of Indian cotton seed for supplying oil to be used as a substitute for ghee, the prices of which have been advancing in recent years beyond the purchasing ability of the greater part of the population. The purpose of this report is to consider the feasibility of the pushing of American cottonseed oil in India by American manufacturers themselves. If they should be successful, it is not believed here that they would injure any Indian cottonseed mills already started or about to start, but, on the contrary, would probably aid in so extending the uses of cottonseed oil here that all interests connected with the industry would benefit.

ATTEMPTS TO IMPORT COTTONSEED OIL.

As to previous attempts to import cottonseed oil into India, it is said that a leading Bombay capitalist and promoter of enterprises of an industrial nature imported a large quantity by way of trial a few years ago, but as the oil at that time was a novelty in the Indian market the experiment failed. Lately the consulting chemist of the Bombay Technical Laboratory has been in communication with a Continental firm with a view to importing some cottonseed oil to test the present local market for it.

In answer to an inquiry a well-known firm of local merchants replied that they had been trying for some time to introduce cottonseed oil and other vegetable substances here as a substitute for ghee, but so far there had been no practical results, the chief reason being the exceedingly conservative attitude of the masses of people against any innovations, particularly in the line of food. They said also that it was their experience that the prices of such substitutes do not as a rule offer sufficient inducement to consumers to take up with their use.

POSSIBLE DEMAND WIDE.

The principal of the Government Agricultural College at Poona, Bombay Presidency, when questioned as to the possibility of shipping American cottonseed oil to India to make vegetable ghee, and as to whether he thought the conservatism of the people would prove an insuperable barrier in the matter, expressed an encouraging opinion. He has for some time given special study not only to the subject of cotton seed but also to that of milk products and especially ghee, and has been a strong advocate of cottonseed-oil mills for India. He said that there would undoubtedly be a very considerable demand and ultimately a very large one for ghee made from cottonseed oil if it were put on the market by an enterprising firm, as India is waiting for a good vegetable material to replace ghee as now made.

In view of the fact that cotton seed pressing is now being taken up as an industry in India, he did not know whether there would be any chance for American cottonseed oil to come in and compete successfully and said the matter would want very close investigation from the commercial side. But the demand, he said, is here, and only wants cultivating and developing. He pointed out that only a few months ago a leading Bombay firm had put some cottonseed ghee on the market experimentally, and it was taken at once and freely. Although the prices were much lower than those of genuine ghee, as must naturally be the case, yet nevertheless they returned good profits. He did not think that the conservatism of the people would long be a barrier if cottonseed oil were properly exploited, as the price of genuine ghee has now reached an almost prohibitive figure for the lower middle classes.

PRICES OF GHEE AND EDIBLE OILS.

As the Indian prices, not only for ghee but also for locally produced cottonseed oil, also coconut, mustard, and gingeli oil used as edibles, must be considered by American manufacturers of cottonseed oil to enable them to determine whether it is worth their while to enter the Indian market, the following information on this subject will be of interest:

According to the Indian Merchants' Chamber and Bureau at Bombay, the present (June 26, 1914) prices of ghee in this city are as follows, per maund^a of 28 pounds: Pure Porebunder ghee, \$6.16; pure Hathras ghee, \$5.51; and pure Jafrabadi or Deshi ghee, \$4.70 to \$5.02. The price of cottonseed oil, manufactured at Navsari in the Bombay Presidency by the Indian Cotton Oil Co. (Ltd.), ranges from \$2.43 to \$2.59 per maund of 28 pounds.

In response to an inquiry several members of this chamber and bureau have already written to this office expressing their desire to act as agents for the sale of American cottonseed oil.

The Director of Commercial Intelligence of the India Government at Calcutta has supplied, at my request, statistics which show the general rise in the prices of ghee during the last three years or so. The figures show the annual average wholesale prices of ghee in Calcutta for 1911, 1912, and 1913, and the first four months of 1914,

^a The term "maund" in India is a measure of weight, but the number of pounds it contains varies widely with different articles and in different localities.

and are as follows per maund of 82½ pounds: Yellowish—1911, \$14.19; 1912, \$14.92; 1913, \$17.03; first four months of 1914, \$15.61. White—1911, \$14.75; 1912, \$16.05; 1913, \$17.92; first four months of 1914, \$16.05. The price in 1911 is estimated to have been about 70 per cent higher than in 1890.

The Director of Commercial Intelligence also supplied the present quotations (June, 1914) for edible oils per bazar maund of 82½ pounds: Coconut oil, \$5.51 to \$8.11; mustard oil, \$5.02 to \$5.51; gingeli oil, \$7.29 to \$9.08. He says that these oils may be used in place of ghee for culinary purposes, but there is no oil in India which will serve as a complete substitute; that is, which may be eaten with rice, as butter or melted butter (ghee) is eaten.

AMOUNT OF GHEE CONSUMED.

In a pamphlet on Indian cotton seed issued in 1908 by the Director of Commercial Intelligence, it was stated, in connection with the demand for a ghee substitute, that a reasonable estimate of the number of people in India who were making use of ghee as an article of food would include about a quarter of the total population of approximately 300,000,000, and that the average consumption of those using ghee was estimated at about 8 pounds per head per annum, or in all about 267,000 tons. It was suggested, however, that possibly the consumption per head among those who use ghee might really prove on investigation to be much higher. In the case of the army the daily ration was 2 ounces, which made an aggregate of 45 pounds per year for each man. If one-fourth of the population used ghee and consumed only one-half as much as the army ration, the total consumption must exceed 750,000 tons. In Bombay City, where ghee was subject to octroi duties, so that fairly accurate figures were available, it appeared that the consumption by the whole population amounted to 12.17 pounds per head. The director said that a wholesome ghee substitute, if made from Indian cotton seed by a process which the people knew to be inoffensive to their prejudices, would appeal to a large proportion of the remaining 225,000,000 inhabitants, who at present rates can not afford to use ghee.

COMPOSITION, MANUFACTURE, AND SALE OF GHEE.

For the enlightenment of American manufacturers of cottonseed oil who may not already know the nature of the substance called ghee, which is such an important article of food in this country, it may be explained that ghee is clarified butter or butter heated for about 12 hours, until the greater part of its moisture has evaporated. Ghee is used for all purposes for which butter is used in Europe or America, such as the cooking of meat, fish, vegetables, curries, rice, etc., and in the preparation of sweetmeats, and it is also eaten uncooked with bread and rice. With the poor it is a luxury for feast days, and ordinarily its place is taken by sweet vegetable oils.

The ordinary ghee of the Indian bazars is principally derived from buffalo milk. One quart of buffalo milk yields about 3 ounces of ghee, while the same quantity of cow's milk may afford only about one-half that quantity, or, with extra fine qualities, perhaps three-fourths. Ghee from goat's milk is inferior, owing to its disagreeable odor, while that of sheep's milk is often spoken of as superior even to buffalo butter.

In the process of clarification the butter loses about 25 per cent of its weight. The heating causes the oil to rise to the surface, while the refuse, mostly casein, settles below as a sediment. Too much heating is said to give the ghee an acid taste, while imperfect heating renders it liable to putrefaction. The ghee as sold in the market is usually undercooked, owing to the loss in weight which takes place when it is fully cooked. If the ghee is carefully inclosed in skins while still hot it may be preserved for many years without the aid of salt or other preservatives. Formerly all ghee was packed in earthen jars, or for transport to a distance in leathern cases, but in recent years old American kerosene-oil tins have been chiefly employed for this purpose. The chief ghee-producing tracts in India are the United Provinces, Bengal, Rajputana, central India, and the Punjab. By far the greater proportion of the ghee produced is consumed locally, and the article seldom or never appears in trade returns.

SUBSTANCES USED IN MIXING.

The chief articles used in mixing with ghee are vegetable oils, as coconut, groundnut, cotton, safflower, poppy, sesamum, niger, and kokam. These are all harmless enough, though cheaper than ghee; but injurious oils are also said to be used. The simplest method of ascertaining adulteration and of purifying the ghee at the same time is to bring a given quantity to a boil, and then dash cold water on it. The oil will rise to the surface and part from its admixtures.

LOCAL VIEW CONCERNING AMERICAN COMPETITION.

In connection with the possibility of American manufacturers of cottonseed oil entering the India market with their product, it appears to be the belief in India that American manufacturers would usually find their own market more profitable. An interesting comment on the above report has been published by Mr. R. L. Sutaria, manager of the Indian Cotton Oil Co. He states:

I have before me the October number of the Cottonseed Oil Magazine, published in America. It contains an article by Mr. Henry D. Baker, the American consul in Bombay, under the heading "India as a market for cottonseed oil." In the consul's own words, "the purpose of this report is to consider the feasibility of the pushing of American cottonseed oil in India by American manufacturers themselves." Although he is of opinion that such a course would not injure any Indian mill, there is, I fear, a distinct danger there. Fortunately cottonseed oil commands comparatively higher values in the Western markets, rendering its importations from those sources unremunerative. Unless, therefore, the American is prepared to make some sacrifice in order to capture a new market, India need not fear competition from that quarter. Conditions may not, however, always remain the same, and it is quite possible that the Indian mills may have to suffer from occasional American raids.

COTTONSEED OIL INDUSTRY IN MYSORE.

The Indian Trade Journal publishes an article concerning the prospects of a proposed cottonseed oil industry in Mysore State. It was written by Mr. C. Ranganatha Rao Sahib, secretary to the Industries and Commerce Committee of the Mysore Economic Conference.

In a brief introduction to the article Mr. A. Chatterton, Director of Industries of the Mysore Government, explains that one of the most remarkable features of the external trade of India is the rapid increase during recent years, in the imports of milk products, and much attention is now being paid in various parts of the country to the develop-

ment of dairy farms, the object of which will be to supply pure milk and pure ghee or butter. Mr. Chatterton states in his introduction:

It seems certain that in the immediate future dairy farming in India will be largely developed, but it seems equally certain that the dairy farmer will have to come to a cottonseed mill for part of his cattle food. As to the demand for cottonseed oil, its marked superiority over gingeli and other kinds of cheap vegetable oils will command for it a ready market when the price at which it can be sold is not much higher. For most culinary purposes cottonseed oil may be used in place of ghee, and with decided advantage, as the bulk of the ghee available on the market is contaminated by admixture with animal fats, the use of which is forbidden to every caste Hindu.

The general conclusions of the article noted may be summarized as follows:

1. Indian cotton seed has attained a permanent hold on the European market as a valuable source of oil and cake and commands steadily increasing prices there.
2. The magnitude of the cottonseed oil industry in the United States indicates in a general way the possibilities of future development if taken up in the proper manner in India, the next largest cotton producing country in the world.
3. The pioneers who have started the industry in India have created a market for the products and solved all the technical problems connected with the industry in India, so that it is no longer in an experimental stage.

PROPOSED NEW MILL.

On December 22, 1913, a public meeting was held in Bangalore, the leading city of Mysore, at which an abstract of the article written by Mr. C. Ranganatha Rao Sahib, was read. Mr. Chatterton, the Director of Industries of Mysore, stated at the meeting that he was authorized to announce that should a properly supported company be floated for the manufacture of cottonseed oil, the Mysore Government would take shares to the extent of about \$16,000, provided the balance was subscribed by the public. It was decided at the meeting that the information justified vigorous measures with a view to erect a cotton-oil factory in the State. The flotation of a joint stock company was determined upon and an influential directorate formed. The cost of crushing, together with refining, is estimated at about \$35,000 for 6,000 tons, although it is hoped that the cost will be much below this. The new mill will be located either at Davangere or Harihar after a comparison of the advantages of both these towns, which are in Mysore State. It has been decided to place the management of the factory in the hands of an expert, who has had considerable experience in the management of several cottonseed oil mills in England.

CAUSE OF PREVIOUS FAILURES.

Several cottonseed oil mills started not long ago in the Bombay Presidency failed to meet with any financial success, apparently because of inexperience of managers and local conditions and lack of appropriate machinery. A leading financial interest in Bombay has obtained from a local chemical and agricultural expert a comprehensive opinion as to the cause of such failure, with a view to profiting thereby, in connection with a cottonseed oil mill it intends to start in Bombay when the present financial depression has passed away. It would appear that the loss in refining the oil has been excessive, and it is suggested that to secure economical refining it would be necessary to arrange for a good dry storage of seed.

Also there was found to be a great undue expense through damage to the camel's hair press cloth from tearing, owing to jerky and spasmodic pressure applied through unsuitable machinery. It was recommended that in order that the application of pressure should be uniform, it should be regulated by automatic choker valves in good steadily working pumps, a poor type of these having been previously used, from which it was hopeless to apply steadily accumulating pressure.

AMERICAN MACHINERY.

It was mentioned that, generally speaking, the machinery which had been imported from England for this cottonseed oil industry had involved heavy loss of time, money, and energy, and it was suggested that American machinery would have been preferable. It was recommended that to reduce cost of crushing the capacity of the mills should be at least 60 tons by night and day, whereas the plant which failed could crush only 35 tons of seed in 23 hours, the machines being too small for economical use. The presses ought to be of full size with 15 to 16 boxes, 16-inch ram, and capable of pressing at $2\frac{1}{2}$ tons pressure per square inch. The plant should also be capable of crushing other seeds like castor, linseed, groundnut, etc., so that if at any time a particular class of seeds is found not paying, due to high prices, damaged crops, etc., there is always the option to crush more remunerative seeds available in the market, instead of closing down the mills till the market improves.

An estimate of machinery for an up-to-date plant, it was mentioned, would, in accordance with a tender already received from the United States, amount to \$22,500 for treating 390 to 425 tons of cotton seed per week by four presses. If additional machinery were installed for the treatment of other seeds as suggested, about \$5,000 should be added to such estimate.

COCONUT PALM AND PRODUCTS.

[Indian (Government) Trade Journal.]

One of the widely distributed trees in India is the coconut palm, and its products constitute an important item in Indian agriculture and trade, not to speak of aliment and domestic use. The area under coconut trees in India was estimated in 1907 to have been about 480,000 acres. The greater part of the trade in coconuts, in the oil, and in the coir and its manufactures is internal trade, which does not come statistically into sight. The average annual yield of nuts per tree is said to be 80 to 100 by count. A recent article in a contemporary gives 40 for Mysore. Besides being largely used for extraction of oil for domestic and local purposes, the nut is widely eaten in various forms. It is said to be increasingly relied on because of the high price of ghee (native butter) in recent years. The "meat," or poonac, after expression of the oil, is used locally as cattle food and manure, and a quantity of it is said to go to Ceylon for manurial purposes.

EXPORTS OF COPRA.

In parts of India, notably the southern and southwestern coast, the coconut is dried in large quantities for exportation as copra, from which oil is extracted, the residue going to patent oil cakes, etc.

The quantity and value of exports of copra from India and Madras Presidency, respectively, in the last five years were as follows:

Year.	India.		Madras.	
	Long tons.	Value.	Long tons.	Value.
1909-10.....	26,708	\$2,407,088	26,609	\$2,408,136
1910-11.....	22,481	2,539,067	22,295	2,539,067
1911-12.....	31,876	3,671,375	31,618	3,671,375
1912-13.....	34,350	4,179,667	34,230	4,165,314
1913-14.....	38,192	5,060,313	38,086	5,043,490

In conformity with the great rise of prices for all oleaginous materials in recent years, the price of copra has risen, and the above export figures show a rise of about a third in the value per unit. Malabar copra is usually quoted in Europe at a higher rate than copra from other sources, and improvement in methods of drying would strengthen its position. The humidity of the air in the littoral tracts, where coconut thrives best and where copra is most largely made for exportation, retards drying and gives time for decomposition. The shortness of the dry season induces the cultivator to gather immature nuts, which yield copra with a relatively low content of oil and albumen and with high susceptibility to molds, bacteria, and enzymes. Artificial drying by correct methods inhibitory to and destructive of microorganisms not only produce a better copra, but would enable manufacturers to extend the season. There are lots of nuts available in the wet season, but it is impossible to dry them. Improved methods of drying are being adopted in other countries and will doubtless in time be introduced into India. The water content in copra should be as low as 5 per cent if decomposition is to be prevented. In India it is usually 6 per cent and upward, and yet Malabar copra commands a premium.

DESICCATED COCONUT AND COCONUT OIL.

Desiccated coconut, as distinct from copra, is wanted in Europe for confectionery. Attempts have been made in southern India to produce the article industrially, but have failed because of Ceylon's competition. It was found that while three Ceylon coconuts gave 1 pound of desiccated, $5\frac{1}{2}$ Malabar nuts were required for the same quantity. Prices of coconuts themselves were also in favor of Ceylon. The successful introduction of this industry depends on improved drying practice.

The exports (quantity and value) of coconut oil from India and the Madras Presidency, respectively, during the last five years were as follows (imperial gallon=1 $\frac{1}{2}$ American gallons):

Year.	India.		Madras.	
	Gallons.	Value.	Gallons.	Value.
1909-10.....	2,528,328	\$1,220,898	2,498,291	\$1,203,387
1910-11.....	1,934,603	1,132,157	1,890,291	1,101,509
1911-12.....	2,105,103	1,317,907	2,120,645	1,286,630
1912-13.....	969,494	627,881	929,971	598,073
1913-14.....	1,091,477	754,663	1,060,139	729,381

Efforts are being made in several places to produce a ghee substitute from the coconut oil. A firm at Pondicherry makes a good quality of coco butter which is sold in tins. In the presence of the high prices now ruling for ghee, such an industry should pay well.

FIBER FROM THE HUSKS.

India's exports of raw coir, and those of the Madras Presidency, during the last five years are shown below:

Year.	India.		Madras.	
	Long tons.	Value.	Long tons.	Value.
1909-10.....	658	\$46,027	614	\$42,913
1910-11.....	619	41,565	588	40,000
1911-12.....	584	36,500	512	33,900
1912-13.....	466	31,788	444	30,678
1913-14.....	741	55,673	703	53,668

USE OF THE COCONUT FIBER.

The processes of retting, beating, and drying the husks in the tracts where coconut is largely grown are conducted on a relatively small scale at any one place, because the bulk and weight of the husks compel the coir maker to ret them, so far as possible, where they have been grown; but the aggregate production must be enormous. Here again improved methods would probably bring a larger profit both by expediting the process and by improving the product. The retting takes many months, and during this time the fiber as well as the pulp is more or less attacked. The final drying, grading, and baling of raw coir for export is done in establishments built and equipped for these purposes.

The manufacture of coir, cord, and rope is often carried out in the open and as a cottage industry. The manufacture of coir matting is also conducted in this way, but tends to become centered in factories where supervision can be exercised.

FERMENTED LIQUOR FROM THE SAP.

Coconut palms are tapped for toddy, more particularly in Guntur, Nellore, Madras, and in the southern and western districts of the Madras Presidency, and the yield is calculated at 35 gallons per tree per year. Toddy, a corruption of the vernacular *tari*, is the juice obtained by tapping from the coconut and other palms. From the fermented liquor a spirit is obtained by distillation. Sugar is also extracted in some districts from the unfermented juice.

FRUITS AND NUTS.

CITRUS FRUITS.

The most important district in India for the production of oranges (*Citrus aurantium*, var. *sinensis*) is Nagpur, in the Central Provinces, about halfway between Bombay and Calcutta. In Nagpur the orange yields or can yield two crops a year. The plants flower from February to March and the fruit is ripe from November to December or January. The second flowering is from June to July, and the fruit ripens from March to April. The oranges of the second crop are the sweetest and coming as they do at the beginning of the hot season are much valued. These are plucked green and thus are rarely allowed to change into the characteristic yellow color of the other crop. About the middle of May the roots are exposed and the plants manured. Pruning is unknown in the Nagpur groves, and with the exception of being watered freely in the hot season, the plants receive little or no further attention.

LEMONS AND LIMES.

Lemons (*Citrus medica*, var. *limon*) are fairly extensively cultivated here and there all over India, although most of the fruit known as lemons are varieties of lime (*Citrus medica*, var. *acida*, called in India "mitha nimbu"). The wild lime is the chief budding stock for all species of oranges, lemons, and citrons in India. The juice of this fruit is universally used for flavoring soups, curries, fish, etc., since it imparts a pleasant acid taste and agreeable flavor. It is also largely used in domestic medicine. The small sour limes are extensively employed for sherbets and in the manufacture of lime juice and the large ones made into various preserves.

FRUIT TRADE OF BALUCHISTAN.

There has recently been a remarkable development of fruit cultivation in Baluchistan, and fruit is now the most important export product of the country. The chief fruit market is Quetta, the largest city of Balschistan and the seat of British authority. As Quetta is located but 60 miles south of the Afghanistan border, it is the chief market for the fruit of that country also. Most of the Afghanistan fruit reaches Baluchistan at New Chaman, only 2 miles from the boundary line, being brought thither by camels or donkeys from Kandahar, the leading city of southern Afghanistan; from New Chaman it is transported by rail to Quetta.

The Baluchistan and Afghanistan fruit exported from Quetta is known all over India as "Quetta fruit" and now furnishes the chief business to the Northwestern Railway extension into Baluchistan. During the fruit season, from early in August until near the end of October, a fruit train of 10 to 15 cars is operated daily from Quetta for the distribution of fruit to the leading cities of India. This fruit

trade is chiefly in the hands of dealers from Kandahar, who have shops in New Chaman and Quetta and buy all the fruit arriving from both Afghanistan and local gardens and orchards.

VARIETIES AND SEASONS.

A leading fruit commission agent at Quetta, who exports largely to India, supplied the following information as to the varieties of fruit sold in that city, the seasons at which they are in the market, and the prices prevailing in 1913:

Fruit.	Season during which procurable.	Price per pound.
Peaches:		Cents.
First quality (large).....	Aug. 1-Oct. 31.....	8
Second quality (middling).....	July 15-31.....	8
Do.....	Aug. 1-Oct. 31.....	6
Third quality.....	July 15-31.....	6
Do.....	Aug. 1-Oct. 31.....	4
Nectarines.....	July 15-Aug. 31.....	6
Pears:		
Large.....	do.....	16
Kandahari.....	Aug. 1-Dec. 31.....	16
Plums:		
Greengages.....	July 15-Aug. 15.....	6
Damsons (these are available in a very limited quantity).....	July 15-31.....	8
Apples:		
Green, cooking, large (best quality).....	July 15-Sept. 30.....	8
Red, cooking, large (best quality).....	do.....	12
Sweet.....	Aug. 15-Dec. 31.....	12
Grapes:		
Red.....	Aug. 1-Oct. 31.....	8
Black.....	July 15-Aug. 31.....	8
Long.....	Aug. 15-Dec. 31.....	8
Seedless, small.....	Aug. 1-Nov. 30.....	8
Pomegranates:		
First quality (weight about 1 pound each).....	Sept. 1-Jan. 15.....	6
Second quality.....	do.....	4
Melons, sweet:		
Garma.....	July 15-Aug. 15.....	4
Sarda.....	Aug. 1-Sept. 30.....	4
Other.....	Oct. 1-Nov. 30.....	8
Apricots (best quality).....	May 20-July 20.....	4

CULTIVATION OF MELONS AND GRAPES.

The cultivation of melons and of grapes is especially important and is expanding rapidly. An acre of good melons near Quetta will, it is estimated, yield \$50 to \$70. There are two principal kinds of melons—"garma" or summer, and "sarda" or autumn melons. The latter, coming into the market from about August 1 to November 30, have remarkable keeping qualities, are transported with very little risk of injury, and will remain in condition for eating even up to January. Those raised in Baluchistan are grown from seed imported from Kabul or Kandahar in Afghanistan and include both watermelons and sweet melons, the former being the cheaper and chiefly consumed by the poorer classes. In places remote from the railway melons are generally bartered for grain. The bunches of grapes are, as a rule, very large in size and delicious in flavor. There is an especially well-flavored and sweet small seedless grape, known as the "lal grape," the skin of which is too delicate to make it suitable for export. This grape can, however, be converted into a most excellent raisin.

GOVERNMENT EXPERIMENT STATION.

The fruit industry of Baluchistan has assumed such importance that the Government authorities are doing all they can to improve the methods of culture and packing. In 1911 a large fruit and agricultural experiment station was started about 2 miles from Quetta, where three artesian bores, 80, 150, and 250 feet in depth, have been laid down to tap three different water-bearing gravels. Pumping from one of these bores by means of an oil engine increased the flow from 600 gallons to 4,250 gallons per hour. Good crops of melons, grapes, peaches, tomatoes, etc., have already been produced here by irrigation and by means of surface cultivation after winter rains.

A considerable amount of work has been done in this experiment station in working out the best methods of transporting fruit from Baluchistan to India. It was found that the cheapest and best packages were those made up with chip and boards imported from Glasgow. The previous practice had been to use, even for such delicate produce as grapes and peaches, old kerosene boxes, and wicker baskets tightly covered with canvas to prevent theft, grass and leaves being commonly employed for packing. Thus there was no ventilation, while the packing material gave out moisture instead of absorbing that from the fruit. In consequence fermentation and decay were hastened, the flavor spoiled, and often the packages, being nonrigid, were crushed out of shape in transit by the weight of others above them. On the railway fruit vans the packages were loaded without regard to shape, size, or weight, with a resulting great loss in shelf space. Some of the wicker baskets being too heavy for easy lifting, were rolled out of the railway vans with considerable impact onto platforms where reshipment or distribution took place.

In 1912, at the suggestion of Mr. Albert Howard, Imperial Economic Botanist of the Government of India, who had been observing the methods of packing fruit and transporting it to the London market, it was decided to use the light nonreturnable packages for fruit made of chips and boards from Glasgow. In reporting to the Baluchistan authorities the result of his investigation in England Mr. Howard stated that it was found there was a growing tendency in Great Britain to copy the cheap, nonreturnable gift packages of the Climax type now such a feature of fruit transport in the United States.

BOXES FROM GLASGOW.

Arrangements are now being carried out with the British Basket Co. at Glasgow for supplying boxes for fruit for export to India. These consist of peach crates with chip compartments to hold less than 10 pounds, as anything over 10 pounds pays, under the railway regulations, the same rate as 20 pounds; grape boxes for small consignments; various forms of Climax baskets for local use; nonreturnable crates for the wholesale trade; and returnable crates for short journeys on the Northwestern Railway and for carrying fruit on camels.

INFORMATION DESIRED.

While in Baluchistan I found that there was much desire to know details concerning American methods of packing and transporting

fruit and the use of evaporators and other drying or preserving mechanisms. It was suggested that any catalogues, etc., concerning fruit boxes, evaporators, fruit-spraying machines, etc., would be very welcome, and might result in some business with the United States. Such catalogues and other information might be sent to The Honorable the Agent to the Governor General, Quetta, Baluchistan, or to J. W. N. Cumming, Esq.; manager of the fruit experiment station, Quetta (ordinary address, Honorary Secretary, McMahon Museum, Quetta, Baluchistan).

CANNING MANGOES.

[By Consul General William H. Michael, Calcutta.]

A few years ago a young Hindu named A. B. Sircar conceived the idea of canning mangoes in India. After giving the matter considerable thought he went to the United States to learn the art of canning peaches and other fruits grown in California, and also the trade of tinner, or at least enough of the trade to be able to manufacture tin cans and to solder the cans in the best manner when filled with fruit.

He spent several years in different canneries in California, and also obtained degrees in chemistry and bacteriology. He returned to Calcutta and secured sufficient financial backing to establish a plant at Muzaffarpur, which is about 350 miles from Calcutta, on the East Indian Railway. About \$28,330 has been expended on the plant, and all the machinery was purchased in the United States.

PROCESS OF CANNING—LABOR AND WAGES.

The process of canning the mango is precisely the same as that employed in canning freestone peaches in California. The mangoes are carefully pared and the stones taken out. Overripe, bruised, or otherwise unfit fruits are rejected. The mangoes thus stripped of their peel and stones are put in cans, which are then weighed and filled with sirup. Then the cap is soldered onto the opening of the can with a capping steel, leaving a vent hole in the middle of the can for driving out the air inside. Steam from a boiler is passed into water in a large wooden vat and the cans are placed in the boiling water in crates suspended from a crane. This is called exhausting. After the air has been driven out the vent hole is soldered up and the cans are put in boiling water. This operation is called processing. After a certain time the cans are taken out and placed in the cooling vat. Some of the cans are put in an incubator and the fruit examined with a microscope to see whether it is free from bacteria.

BANANAS.

The banana, or plantain, is cultivated throughout India, except in the extreme northwest, and it is grown at altitudes of 5,000 to 6,000 feet above sea level. In certain localities large gardens are planted almost exclusively with the fruit, and the produce is systematically sent to Calcutta, Bombay, and other large towns. More frequently it is cultivated merely in small patches around the homesteads and for home consumption.

The name banana is seldom used in India, except by a few English people. All kinds of this fruit are indiscriminately called plantains, and those eaten raw for dessert are known as table plantains. After mangoes, plantains are the commonest and most highly prized of all Indian fruits; the coarser kinds constitute a staple article of diet in many parts of India and the Malay Peninsula, most of these being cooked before being eaten. It has been proved that the produce from 1 acre will support a much greater number of people than a similar area under any other crop, and the immense yield may be preserved for an indefinite period by drying the fruit and preparing meal from it. Plantain meal is made by stripping off the husk, slicing the core, drying it in the sun, and then reducing it to powder, and finally sifting. It is calculated that the fresh core will give 40 per cent of meal and that an acre of average quality will yield over a ton.

Other parts of the plant besides the fruit are used as food. The flower heads of many kinds are cooked, generally in curries, and the inner portion of the stem, called "thor," is also edible. The shoots and tops of young plants are occasionally used as a vegetable and are given as fodder to sheep and cattle. The outer sheaths are valued as elephant fodder, and the root stock is sometimes given to cattle to increase the quantity of milk.

MACHINERY FOR MAKING BANANA FLOUR.

The Director of Commercial Intelligence for the Government of India has received inquiries from banana growers in India as to the possibility of using improved machines for preparing banana flour, and he would be glad to receive communications from American manufacturers of such machines, as he desires to lend any advice and encouragement possible toward the establishment of a banana-flour industry in India. He has heard that such flour is now being prepared from improved machines in the Philippine Islands. He states that the most important feature would be quick and economical drying. It is anticipated that cheap and efficient machines would find a large market in India, and perhaps become in time the means of providing a most important food product for millions of people in this country.

USE OF FIBER.

The fiber of the Indian plantain has long been used by the natives of India for cordage purposes, mats, and coarse paper. In appearance it resembles manila hemp, though not so strong as the latter. Vast numbers of the common plantain stems are available in India for extraction of the fiber for industrial purposes.

CASHEW-NUT INDUSTRY.

Cashew nuts, which are an important product of India, are obtained from a tree which it is said was originally introduced from South America, and is now established in the coast forests of India. It thrives in any soil, but especially in sandy places, where it is often gregarious, and in south India is said to be important in coast-dune reclamation.

PRODUCTION AND VALUE.

The bark yields a gum which is obnoxious to insects. The juice which issues from incisions in the bark is used as an indelible marking ink. The bark and the pericarp yield an oil (called dik) which is occasionally employed to tan fishing nets. Two oils are obtainable from this plant: From the pressed kernels, a light yellow oil, of which the finest quality is equal to almond oil; and from the shell of the nut an acrid and powerful fluid called "cardole," which is efficacious in preserving carved wood, books, etc., against white ants, and is also used as a rubefacient and vesicant medicine. The spirit distilled from the juice of the fruit is a useful stimulant, and the fruit itself has antiscorbutic properties. The seeds, known as cashew nuts, are eaten roasted and with sugar are made into confectionery. The fruit pedicels are also eaten. The timber (weight 30 to 38 pounds per cubic foot) is used for packing cases, for boat building, and for making charcoal. Cashew nuts are imported into Bombay from Goa in Portuguese India in very considerable quantities.

TIME AND PLACES OF SHIPMENT.

On the west coast of India the new crop is available for shipment in April and May, and at this time a portion is shipped in the husk to Bombay, but the main crop is shipped after the monsoon in October and November. As far as Bombay is concerned, the main crop is available for export between October and February, after the nuts have been brought here by the coasting vessels which have resumed sailing up and down the western coast. As the nuts are liable to deterioration from long storage, it is always desirable that consignments be shipped soon after their arrival in the local market. The imports of cashew nuts into Bombay are mainly from Malwa on the west coast of India, from Goa in Portuguese India, from Mangalore on the same west coast, and from Mozambique in Africa, given in the order of the estimated value of crops.

Information regarding the cashew-nut industry was obtained through the courteous assistance of the economic botanist of the Bombay Government at Poona, from the following sources: The collector of customs at Madras, the agricultural overseer at Ratnagiri on the west coast of India, and the agricultural overseer of Kanara, a district just south of Portuguese India on the west coast.

FORESTRY AND FOREST PRODUCTS.

[By Consul General James A. Smith, Calcutta.]

The history of forestry, as an organized service in India, may be said to have really commenced in 1864. During the following 40 years the very existence of the Forest Department depended on its justifying itself by immediate financial results. Under such circumstances any idea of spending money usefully on scientific research was out of the question. In 1906 Lord Curzon established a Forest Research Institute at Dehra Dun, and although it is yet premature to estimate with any degree of accuracy just what the ultimate gain to the Government will be, the institute is more than justifying its existence.

The management of State forests in British India is in the hands of the Indian Forest Service, which is divided, from an administrative point of view, into separate branches, as follows:

- (a) The imperial service, which is recruited and trained in Europe.
- (b) The provincial service, which is recruited in India and trained at the Imperial Forest College at Dehra Dun.
- (c) The subordinate service, comprising an executive staff of forest rangers and a protective staff of deputy rangers, foresters, and forest guards. The personnel of the subordinate service are recruited in India, and the forest rangers are trained either at the Imperial Forest College at Dehra Dun or at provincial forest schools.

In 1894 the Government of India classified its forests into four broad heads, viz:

- (a) Forests the preservation of which is essential on climatic or physical grounds. These are usually situated on hilly country, where the preservation of forest growth is of vital importance in holding the water supply under control in certain areas in order to provide an even flow in the dry season.
- (b) Forests which afford a supply of valuable timbers for commercial purposes, such, for example, as the teak forests of Burma, the sal forests of northern and central India, and the deodar forests of the northwestern Himalayas.
- (c) Minor forests, containing somewhat inferior kinds of timber, and managed for the production of wood, fodder, grazing, and other produce for local consumption; these forests are of great importance and value in agricultural districts.
- (d) Pasture lands. These are not "forests" in the generally understood term, but are grazing grounds managed by the Forest Department.

The forests under the control of the Forest Department cover about one-quarter the area of British India and comprise a variety of types according to variations of climate and local conditions. The following main types may be distinguished:

1. Arid country forests, which extend over Sind, a large portion of Rajputana, Baluchistan, the south of the Punjab, and in dry tracts where the rainfall is less than 20 inches yearly. The number of species is few, the most important of which is the babul or kikar (*Acacia arabica*).
2. Deciduous forests, in which the trees are leafless for a part of the year. They extend over large areas in the sub-Himalayan district, the peninsula of India, and Burma, and comprise the greater part of the teak and sal forests.
3. Evergreen forests, which occur in regions of heavy rainfall, such as the west coast of the peninsula, the eastern sub-Himalayan tracts, and the moister parts of Burma.

4. Hill forests, in which the vegetation varies according to altitude and rainfall. In the eastern Himalayas, Assam, and Burma the hill forests are chiefly composed of the various oaks, magnolias, and laurels; in Assam and Burma the khasia pine (*Pinus khasya*) is to be found at elevations of 3,000 to 7,000 feet. In the northwest Himalayas the chief timber tree is the deodar (*Cedrus deodara*), which is commonly found at elevations of 6,000 to 8,000 feet and is associated with oaks, blue pine, and at the higher elevations, with spruce and silver fir. Below the deodar zone are found extensive forests of long-needled pine (*Pinus longifolia*), which is largely tapped for resin.

5. Tidal forests which occur on the sea coast and along tidal rivers and creeks. The chief of trees under this head belong to the Mangrove family and are characterized by long roots, which act as an anchor to withstand the force of the tides.

A mere outline of the various species of trees to which these different types belong would fill volumes. The total number of woody species in India is about 5,000, of which more than half are trees, the rest being shrubs and climbers. There are several hundred that are economically useful, the three most important of which are the teak (*Tectona grandis*), which makes the best shipbuilding timber in the world, and is found throughout Burma and over a large portion of the Indian Peninsula; the sal (*Shorea robusta*), which grows gregariously over the sub-Himalayan tracts, in Assam, and the northern part of the peninsula, and is the chief source of timber supply for railway sleepers and building materials; and the deodar, or Himalayan cedar (*Cedrus deodara*), which furnishes the chief wood used for building and railway sleepers in northwestern India.

There are any number of other Indian timbers of great commercial importance, such as the Andaman padauk or redwood, the Burmese pynkado or ironwood, ebony, satinwood, Bombay blackwood, sandal-wood, and many others. The minor forest products, such as resins, tans, gums, drugs, fibers, etc., are of signal importance, as may be judged from the fact that the total revenue from these products from Government forests in 1912-13 amounted to over \$3,500,000.

The gross revenue from forests in 1912-13 was over four times as large as the average amount realized during the quinquennium 1877-78 to 1881-82, as is shown by the following table:

Periods.	Gross revenue.	Net revenue.
1877-78 to 1881-82, average.....	\$2,397,500	\$772,666
1912-13.....	10,450,000	4,867,150

EXPORT TRADE IN TEAK.

[By Vice Consul General John Stuart Hunt, Calcutta.]

In British India (inclusive of Burma) teak production may be divided into two general belts, viz, western and eastern. The former extends over the Central Provinces—Berar, Bombay, Malabar, Madras, Mysore, and Travancore—and is bounded on the north by the rivers Nerbudda and Mahanadi, beyond which the only important districts where teak may be found are in Jhansi and Banda. Of this western belt the most important teak forests are in Chanda, north Kanara, Wynnaad, Anamalai, and Travancore. The timber finds its chief outlet from the western coast at Bombay.

The eastern belt extends from Burma and Chittagong to Assam; there is also a small tract in Bamunpokri in the Darjeeling Terai. The most important centers are in Arracan, Pegu, Martaban and Myitkyina, and the Shan States. Outside of India, teak is found in Siam, in the French colonies of Cambodia and Cochinchina, the Dutch Indies, and in Java.

DURABILITY—QUANTITY EXPORTED.

Teak owes its value chiefly to its great durability, due to its large content of resin, which fills up the pores and resists the action of water. When fresh it will not float, but when seasoned floats easily. The oil in the wood prevents its getting waterlogged, and seems also to safeguard it against timber-boring insects. It does not rust iron when worked up with it. In India the chief use of teak is in ship and house building, especially interior house carpentry, and furniture making. It is also used for carving, the noted carved kyaungs or monasteries of Burma being prominent in almost every village of importance.

It is rather coarse grained, greasy to the touch, and has an offensive odor, something like that of decaying shoe leather.

In 1913–14 the total quantity exported from India was 36,334 tons of 42 cubic feet, being 25,087 tons less than in the preceding year.

FORESTATION.

Apart from the foreign export trade, there is a growing demand for teak for domestic consumption. Teak has practically become the staple of the local wood industry for the greater part of the entire Indian subcontinent. In view of this, future sources of supply and a possible substitute for teak must be considered.

Teak is being freely planted by the Indian Forestry Service in the important civil stations all over India, even as far north as Saharanpur, Dehra Dun, and Lahore, but the majority of the trees are young, and it will be many years before they will be fit for timber. In Burma teak forest regeneration is carried on under a special system of cultivation called tanngya cultivation.

BURMA'S PRODUCTION AND EXPORTS OF TEAK.

[By Consul Maxwell K. Moorhead, Rangoon.]

The total volume of teak extracted by Government agency in Burma during 1913 was 41,428 tons of 2,240 pounds, which is about 24,856,800 feet b. m. The number of teak logs sold in Rangoon by the Government was 16,751, weighing 16,595 tons and measuring 9,957,000 board feet; the average price being \$55.68 per 1,000 feet b. m., while that of the preceding year was only \$38.93 per 1,000 feet b. m. This large increase was caused by a shortage in the supply.

The various private firms working in Burma on the lease system extracted 124,156,800 board feet of teak in 1913 and paid a royalty therefor of \$1,599,177. The average royalty paid by the timber com-

panies to the Government for the privilege of extracting teak in Burma in 1913 was \$12.70 per 1,000 feet b. m.

The production of teak and other logs, poles, sawed or square timber in Burma, during the year ended June 30, 1913, is shown in the following table:

Class.	Teak.	Other timber.
Logs.....		<i>Mfeet b. m.</i>
Poles.....	153,833	300,739
Sewed or square.....	574	12,780
All other.....	1,810	8,564
Total.....	156,218	314,637
Firewood.....	96	311,142
Total.....	156,314	625,779

EXPORTS TO FOREIGN COUNTRIES AND INDIAN PORTS.

The value of the exports of teak timber from Burma during each of the last five years ended March 31, is shown in the following table:

Years.	To foreign countries.	To Indian ports out of Burma.	Total.
1910.....	\$1,700,680	\$3,677,130	\$5,377,810
1911.....	2,673,330	3,906,500	6,579,830
1912.....	2,245,400	3,754,670	6,000,070
1913.....	2,928,660	4,008,370	6,937,030
1914.....	2,392,050	3,625,540	6,017,590

The decrease in exports of teak is due to the growing scarcity of timber in the more available forests and the difficulties attending the extraction and transportation from the isolated districts. The principal importing countries of Burma teak in 1914, aside from India proper, were the United Kingdom, which took 16,449,600 feet board measure; Germany, 3,769,200 feet; and the United States, 104,400 feet.

SANDALWOOD.

[By Vice Consul General John Stuart Hunt, Calcutta.]

The sandalwood tree is a small evergreen that rarely attains a height exceeding 40 feet. It grows naturally in the drier parts of Mysore, Coimbatore, and Salem districts, and as far south as Madura and north to Kolhapur. It is found generally at elevations of 2,000 to 3,000 feet. It is a delicate tree and suffers much from injuries inflicted on the bark and stem, and for this reason it flourishes most when protected by thorny jungles, etc. It is cultivated and grows well in some parts of northern India; but in regions out of its indigenous habitat it usually loses to a great extent, if not altogether, the aromatic heartwood for which it is mainly valued.

The sandalwood trade is controlled chiefly by about half a dozen leading European firms, who act as agents in their purchases in Mysore for medicine manufacturers in Europe and in the United States.

There are also a few native merchants in the business, but on account of some of them having yielded to the temptation of adulterating the high-priced oil after distillation, their trade has fallen off considerably, manufacturers in the United States especially desiring to be assured of the purity of the product, deeming it best to purchase the best wood obtainable and then to distill the oil themselves.

SOURCES OF SUPPLY—VARIED USES.

The chief sandalwood area of the world, producing about seven-eighths of the total annual supply, includes a belt in Mysore, about 240 miles long by 16 broad, running from the northwest to the southwest of the Province. A second and much smaller and less important zone lies farther to the east. The total area of both belts is about 5,450 square miles. The grades and materials of sandalwood number about 18; the wood ranges in size from billets not less than 20 pounds in weight, the finest grade, down to the sawdust obtained in sawing up the wood, the lowest grade. Every part has a value. The heart wood alone, which is about one-third of the total weight felled, constitutes the odoriferous wood. In Mysore the collection of sandalwood is entirely restricted to overmature, dead, and fallen trees, and old stumps and roots. All of the sandalwood in the State is owned by the Government, and very serious penalties are attached to any private encroachment on the Government monopoly.

The principal uses of sandalwood other than for medicinal purposes and scents are for wood carving and for manufacturing fragrant boxes, fans, etc. There is also a large use for it for funeral pyres where cremation is practiced in India and China, especially the latter country, where considerable sandalwood is imported in connection with the funerals of the wealthier people. Most of the sandalwood, however, used for other purposes than the manufacture of medicines and high-grade scents is obtained from Western Australia, Queensland, and the Malay Archipelago. The sandalwood of Mysore has not only been known from the most ancient times but for centuries has ranked as the finest quality produced in the world.

DEVELOPMENT OF FORESTRY IN SOUTH INDIA.

[By Consul José de Olivares, Madras.]

Increased attention is yearly devoted to the conservation of forests in south India. The area of reserved forests in the Madras Presidency and Mysore at the end of June, 1913, was 21,322 square miles. The economic value attached to the forests of south India is large and their resources varied. They furnish valuable timber and woods for structural, manufacturing, and medicinal purposes, fuel, leaf fertilizer, forage, and rich grazing areas for live stock.

The commercial woods include teak, ebony, rosewood, Indian mahogany, Chittagong wood (white cedar), sandalwood, pine, erool, bamboo, jambu (black plum), matti, orupoo, nux vomica, rubber, camphor, palmyra, and eucalyptus, besides other varieties, both indigenous and exotic, which are systematically grown and consumed. The total expenditure on the forests of the Madras Presidency and Mysore during the year under review was \$1,203,924, while the gross receipts amounted to \$2,405,645.

THE CULTIVATION OF LAC.

(By Consul General James A. Smith, Calcutta.)

Lac is an important article of commerce in the foreign trade of India, the exports of this material averaging \$7,000,000 to \$9,000,000 yearly. In a recent bulletin of the Agricultural Research Institute at Pusa some interesting details are given as to its cultivation in India.

Lac is the resinous exudation of an insect belonging to the group (*Coccidae*) commonly known as scale insects. It is found in a wild state on a large number of trees, but when cultivated it is grown chiefly on the kusum, palas, ber, beepal, siris, and babul. The very name of the palas tree, laksh taru, shows that the early inhabitants of India utilized it for propagating the lac insect.

The largest quantity of lac is obtained from the Central Provinces and especially from the Chittisgurh and Nagpur Divisions, where the kusum tree abounds. Next to the Central Provinces certain districts of Bengal produce fairly large quantities of lac. It is also produced in Lower Assam, United Provinces, Punjab, and Burma.

Places that are neither very hot nor very cold and where the annual rainfall is about 30 inches are suitable for lac cultivation. Moisture is necessary for the successful development of the insect, but in excess it affects the crop injuriously. Dry, arid places are to be avoided in starting the cultivation. Extremes of heat and cold retard the growth of the insect; with heat the resin melts, the air holes are blocked, and it dies of suffocation. For successfully working lac one must be familiar with the life history of the insect that produces it, which is thus given in a current book of reference:

The insects live upon the twigs of certain trees, and soon become covered with a resinous secretion that increases in thickness, protecting the body and the eggs. When a colony, consisting of a few adult females and one or two males, find their way to a new branch, they attach themselves to the bark and, having pierced it with holes through which they draw up the resinous juices upon which they feed, they become fixed or glued by the superfluous excretion, and after time die, the females forming by their dead bodies little domes or tents over the myriads of minute eggs which they have laid. In a short time the eggs burst into life, and the young, which are very minute, swarm over the twig in such countless numbers as to give it the appearance of being covered with blood-red dust. Generation after generation dwells upon the same twig until it is enveloped in a coating of the resinous exudation often half an inch thick.

LAC FACTORIES—EXPORT TRADE.

The trade in lac, of which India is the main source of supply, is variable and speculative, owing to the great fluctuations in prices. The lac factories in India are confined to Mirzapur, in the United Provinces, and to Calcutta, but small quantities are worked all over India. Stick and seed lac constitute the raw material, but the exports are mainly in the manufactured forms of shellac and button lac. The proportion of shellac and button lac is on the average 80 and 6 per cent, respectively, of the total lac trade. Lac is used chiefly in the manufacture of high-class spirits, varnishes, and sealing wax for gramophone records; also as a softening material in hat making, as an ingredient in lithographic ink, and for insulating purposes in the electrical industry. Much of the lac comes from forests in the Native States where no suitable agency for conservancy or expansion exists. The forest department is carrying on experiments to develop more scientific methods in the cultivation and harvesting of the crop. The

principal customers for shellac and button lac are the United States, the United Kingdom, and Germany.

The value of Calcutta's exports of lac by countries in 1912-13 and 1913-14 is shown in the following table:

Countries of destination.	1912-13	1913-14
Button lac and shellac:		
United States.....	\$2,907,247	\$2,604,226
United Kingdom.....	1,410,312	1,839,861
Germany.....	1,027,156	802,324
France.....	480,650	243,001
All other countries.....	590,783	417,546
Total.....	6,422,158	5,906,958
All other.....	258,249	304,843
Total.....	6,680,407	6,211,801

PRODUCTION OF LAC AND CUTCH IN BURMA.

[Consul Maxwell K. Moorhead, Rangoon.]

The lac industry in Burma has declined during the last few years on account of the difficulty in gathering the crude material in the forests. There is now only one company in Burma engaged in the manufacture of lac, as competition with factories in the other Indian Provinces is difficult on account of the comparatively high cost of labor.

The production of lac in Burma during the year ended June 30, 1913, amounted to 1,110,240 pounds. Exports to foreign countries, consisting chiefly of seed, grain, and button lac, during the year ended March 31, 1914, declined by 399,390 pounds, and \$34,710 in value, to 455,616 pounds, and a value of \$65,860. Most of these exports went to the United States.

Exports of crude stick lac to ports in India in 1913-14 amounted to 709,520 pounds and were valued at \$56,130; a loss in quantity of 499,184 pounds, and in value of \$15,570, compared with those of the preceding year.

DIMINISHING OUTPUT OF CUTCH.

Cutch is prepared by cutting the heartwood of the kair (*Acacia catechu*) tree into chips, which are then boiled in caldrons until the fluid becomes sirupy, when it is taken out and cooled. The cakes of commercial cutch thus obtained are used as a dye for nets, sails, and other articles. The manufacture of cutch in Burma is limited to those having licenses granted by the Forest Department.

The cutch trade has shown a downward tendency during the last 10 years, due to wasteful methods of extraction and the resulting shortage of trees. During the calendar year 1913 the United States imported from Burma 66 long tons, valued at \$10,230.

TURPENTINE AND ROSIN.

The assistant conservator of forests, Mr. F. A. Smythies, of the Naini Tal division of the United Provinces, India, explains the efforts at the Government distillery at Naini Tal, Himalayas, to produce turpentine to compete with the imported American article. It is

shown that by making use of an improved method of steam distillation the sticky residue, which now makes it almost impossible for local turpentine to compete with American turpentine, can be eliminated.

With steady commercial and industrial expansion the demand is bound to increase. He states that India can not hope to compete with the United States in the turpentine industry until it perfects its methods of distillation and packing, but he believes that with present faults eliminated there would be a demand for Indian turpentine fully equal to the maximum possible output. Moreover, he points out that, with the rapid development in India of the resin industry and with the output of turpentine steadily increasing, it becomes a matter of some urgency to correct faults and obtain a good quality of oil in the near future.

IMPROVING THE QUALITY OF TURPENTINE.

By far the greater proportion of turpentine used in India, Mr. Smythies states, is consumed by the paint trade, and for paint manufacture an oil of good quality should show the following essential characteristics: It should be colorless; it should evaporate quickly and evenly; it should have no sticky residue. At the Government distillery near Naini Tal no difficulty is found in obtaining a colorless oil provided care is taken to remove all traces of water, so there will be no rusting in the tins. As regards evaporation, while turpentine from the principal Indian species of pine is not so light and volatile as that from the principal American pines, yet it is no worse than French turpentine from the maritime pine, which is readily taken by paint manufacturers at prices slightly lower than those of best American turpentine. The most objectionable characteristic, however, of the Indian turpentine is the sticky residue that it contains.

THE MAHUA OR MOWRA TREE.

[By Vice Consul General John Stuart Hunt, Calcutta.]

The mahua or mowra is a large deciduous tree growing throughout the forests of Deccan, Carnatic, west coast, and central India and Guzerat, stretching north as far as Oudh and Kumann and eastward across to Orissa. The economic value of the tree is in its edible flowers and oil-yielding seeds, although the gum that flows from incisions on the stems shows an average of 48.9 per cent gutta, 38.8 per cent resin, and 12.3 per cent ash. The bark is also used as a dye, while all the properties of the tree are used to some extent medicinally.

The flowers are eaten extensively while fresh, but are usually dried and cooked with cereals. The dried flowers are also reduced to a powder and cooked in round cakes and mixed with a variety of food-stuffs. Sugar and molasses are made from the mahua. In the Central Provinces alone 1,400,000 natives use mahua as a regular article of food. The flowers are also distilled, which, when carefully carried out, produces a spirit not unlike good Irish whisky.

The oil from mahua seeds is used in butter and for lubricating and illuminating purposes. Bombay is the principal exporting center for mahua seed, the total shipments from India having been 415,662 hundredweight (of 112 pounds each), valued at \$1,009,103 in 1910-11; 795,126 hundredweight, valued at \$1,909,371 in 1911-12; 265,861

hundredweight, valued at \$695,486 in 1912-13; and 665,979 hundred-weight, valued at \$1,769,625 in 1913-14. Germany, which had been taking over one-half of the exports, in the year 1913-14 took five-sixths of the shipments. Germany crushed the seed and used the oil in soap and candle making. (With the progress in neutralization of vegetable fats, however, it is possible that the oil is now also used for comestible butter.)

DEMAND FOR PORTABLE TIMBER-FELLING MACHINES.

The mountainous portions of India in the Himalayas and some interior ranges have forests growing on slopes which are inclined often 50 per cent on the average. A vast amount of timber growing on these slopes, averaging perhaps 2 feet in diameter, can not be utilized for sawmilling purposes owing to the difficulty of cutting the timber where the ground is so steep.

It was suggested to me that if a portable tree-felling machine could be introduced into India, such as could be conveniently used on such steep slopes, it would be of considerable advantage to India's timber industry. Ordinary sawmilling machinery can not be used on these slopes owing to the lack of level resting places. It was mentioned that possibly an augur, portable by hand, which could bore holes through a trunk radially with an electric motor, working automatically or by hand control, would be just the kind of appliance which would be very useful. As labor in the mountains is of an unreliable sort, the simpler and more automatic the appliance the better. The tool should have sufficient strength and stiffness and be a kind of screw augur, being able to clear itself after boring.

If the timber could be conveniently felled, it could easily be lowered down the mountain slope to rivers or to any sawmills in level spaces below. The chief use of such timber is in manufacturing boxes.

PACIFIC COAST TIMBER FOR RAILWAYS.

The Railway Board of India, headquarters at Simla, arranged early in 1914 for two experimental shipments of Pacific coast timber for use as sleepers or ties on Indian railways. One shipment comprised Oregon pine sleepers, creosoted, cost \$1.44 per sleeper, c. i. f. Calcutta, and the other shipment California redwood, uncreosoted, \$1.20 per sleeper. These sleepers were for broad-gauge railways, the dimensions being 9 feet by 10 inches by 5 inches. The Oregon pine imported is creosoted by the Ruping process.

The advance in prices of Australian jarrah caused railway authorities in India to give attention to the possibility of making use of less expensive American timber for the sleepers required. As Australian jarrah was quoted in April, 1914, at \$2.80 per sleeper(broad gauge), there thus seemed a possibility of considerable business in American Pacific coast timber. The Oudh & Rohilkhand Railway, the East Indian Railway, the Assam Bengal Railway, and the Bombay, Baroda & Central India Railway have experimented with timber from the Pacific coast of the United States with successful results. Generally speaking, the Indian railways purchase between 500,000 and 1,200,000 sleepers every year. It is necessary to make use of timber

which would successfully resist the white ants which are prevalent throughout India and also not show undue deterioration from tropical climate.

AMERICAN SHOOKS IN BURMA.

[By Consul Maxwell K. Moorhead, Rangoon.]

Practically no European or American lumber is imported into Burma for building purposes, locally grown teakwood being universally used for buildings, vessels, and vehicles. During the year ended March 31, 1914, there were imported from all countries through the port of Rangoon deal and pine wood valued at \$131,060, of which \$124,590 worth came from the United Kingdom, and small quantities from Germany and Japan. Most of this wood consisted of pine shooks imported by oil refineries of Rangoon for the manufacture of candle boxes. Shooks are usually sold on credit or documents against acceptance at 30 to 90 days.

THE FISHERIES.

The fisheries in Indian waters are unorganized in the modern sense. However, vast numbers of the coastal population are engaged in fishing. In Bengal alone nearly two million persons are supported by catching or selling fish. The best salt-water fish of Bengal are the bekti, tarsi or mango, mullet, pomfret, and sole. A few years ago the Bengal Government initiated deep-sea fishing by introducing a steam trawler, but it was not developed commercially. Inland the hilsa (*Clupea lisha*) is found in the Ganges, while the rohu (*Labeo rohita*) and the katal (*Catla buchanani*) abound everywhere; prawns and crabs are caught in myriads.

The fisheries of Burma are important financially and otherwise, especially on inland waters, where the Government sells at auction the right to work the fisheries. Pearling is carried on in the Mergui Archipelago.

For a Province with so much seaboard, and the estuary of the Indus, the Bombay Presidency fisheries are singularly limited. The fishing boats and appliances are very small. The Government of Baroda, which lies within the Bombay Presidency, being desirous of introducing oyster culture, has sent a student to Pulicat, where the Madras Fisheries Department is engaged in such work.

The Madras irrigation basins usually contain coarse fish, the right of netting which is sold annually. The coast fisheries employ thousands, and salting the catch is a considerable industry. The Government is aiding the development of the Madras fisheries.

IMPORTS OF FISH.

Notwithstanding the large domestic fish production, imports of preserved fish are considerable. Details of imports of canned fish are not available, but over \$1,000,000 worth of salted fish are imported annually, mostly from the Straits Settlements, which, however, would include transshipments at Singapore. Export statistics of the United States show shipments of canned salmon to the British East Indies during the fiscal year 1914 as follows: British India, 327,817 pounds, worth \$21,168; Straits Settlements, 1,541,408 pounds, worth \$90,292; other British Indies, 135,840 pounds, worth \$9,141. As these sales are very small for so populous a region, the following report by a former consul at Bombay will explain how American canned fish trade might be extended in India.

SALMON AND COD IMPORTS.

[By Consul Edwin S. Cunningham, Bombay.]

There is no way of determining the amount of salmon imported into Bombay, but it is evident that the trade is very small.

The canned salmon imported direct from the United States is usually shipped from the Pacific coast, but by far the greater part of American

salmon imported is indented through London firms. British Columbia salmon reaches this market through the same channels. The high grades of salmon are used by the Europeans resident in India, Anglo-Indians, and the wealthier Parsis. The last class prefer the best quality.

Indentations are made by European firms through their London houses or occasionally through an American commission house at New York or San Francisco. When the shipment is sufficient to obtain a minimum freight rate these houses prefer to order direct from San Francisco, believing that they get a superior article at low rates. Unfortunately, there are very few firms that are able to handle such quantities as will enable them to obtain such a rate. Much of the salmon imported is packed with the label of the English firm. It is sold in the market by European and native shops in the same manner as other provisions.

The methods of packing salmon for this market are satisfactory. The only suggestion offered by firms consulted was that the goods might be more carefully guarded against theft en route. Pound cans arrive in cases of four dozen each. When half-pound cans are ordered they are packed eight dozen to the case.

There are no specific statutory enactments regulating the importation of canned food products into India. The Indian merchandise marks act, however, requires that the trade description must be correct, and action would be taken under this act should goods described as pure be found, on analysis, to be adulterated or otherwise impure.

The trade in canned salmon might be increased materially if the Pacific coast canner could arrange for regular shipments to some well-known firm in Bombay for distribution to the various other firms either against indents or to be delivered upon application. Extensive stocks can not be carried owing to climatic conditions, but if assurances of prompt and regular shipments were made to a local dealer of whom supplies could be purchased, then all shops could confidently carry a small stock. Salmon that arrives at the beginning of the monsoon, say about the 1st of June, should be disposed of within three months at the most. Stocks arriving after the monsoon or after the middle of September will keep until the next monsoon.

Both salted and unsalted dry cod are imported into the port of Bombay. The trade is a very large one. The only question would be whether American curers could quote a price for dry codfish sufficiently low to compete in this market. Very little cod is imported, but there would be no difficulty in establishing a market, provided it could be sold in competition with the other dried fish.

Ninety per cent of the population of western India is dependent upon fish for sustenance. It is doubtful whether any other country has such a variety of fish, but very little has been done to improve the fisheries. The most primitive methods are used, and as a result an enormous amount of food remains uncaptured.

When the fishermen are trained to more approved and profitable methods in catching, curing, and preserving the valuable food which abounds in the coastal seas and inlets India will not only be able to supply her own wants, but will have an immense quantity for export.

SARDINE OIL AND GUANO INDUSTRIES.

A new industry, established on the west coast of south India, for manufacturing fish oil and guano from the oil sardine promises to be quite profitable to small factories scattered along the coast line. Previously sardines in many thousands of tons had been dried whole on the beach for manure, but by this wasteful process all the oil was lost.

The rapid development of this new industry is shown by the fact that while in 1909 there were but 2 little factories in operation, 1 being a governmental experiment station, in the season 1910-11, there were 9 small factories running, and many more being prepared or projected, and the season 1911-12 opened with no less than 45 small factories at Malabar and South Canara, while there was a probability of others being established in Cochin and Travancore.

GRADES OF THE OIL.

These small factories limit themselves to the production of crude brown oil for the jute industry in Calcutta, which prefers this class of oil and does not desire the removal of the stearin. However, there is said to be an immense and better-priced market for finer oils, especially for refined and deodorized, and in order to show the possibility of establishing such industry successfully the governmental experiment station at Cannanore has purchased a filter press to separate the oil and stearin and to refine the oil, and also a special laboratory plant for experiments in deodorizing. Some of the best oil has been supplied gratis to local medical men, who use it internally in various cases and who consider it probably a useful substitute for other oils. This better-class oil, however, is in chief demand for the leather factories in Cawnpore and for paint and color works.

The Madras Government, to which credit is due for showing the way by experiments to the present thriving industry of producing crude brown oil, in 1913 opened up at Calicut on this coast an experimental cannery for dealing with the mackerels, sardines, and prawns so plentiful in these waters. The canning plant in use consists entirely of locally made articles except the processing (cooking or sterilizing) kettles, which are small autoclaves obtained from Europe, that is, strong vessels in which the cans are heated by pressure steam, usually at about 12 pounds, generated within the vessels themselves by powerful lamps or fire applied externally. This gives a temperature of over 240° F., sufficient to sterilize all fish produce. During its first season the results have been moderately successful, but with the experience gained it is hoped that success may be more pronounced in succeeding years.

Fat sardines are also now treated as pilchards, the ungutted fish being heavily salted, and then submitted to pressure in barrels, when much of the oil is extracted. The fish remain as a hard mass, and is largely exported to Italy.

FISH PASTES AND POWDERS.

Another item of work at this experimental cannery has been the preparation and canning of pure, unadulterated fish pastes, chiefly mackerel and prawn. Here there has been marked success, and the future experiments relate mainly to market questions, such as the

provision of good materials at moderate rates, the flavorings most suited to Indian tastes, the obtaining of suitable tins and other containers properly decorated, etc. Effort has chiefly been directed to the production of plain but palatable paste intended for general consumption. The station will soon be prepared to train students and publish its recipes.

Fish powder has also been prepared with the plant used in preparing pastes; the product is cheap and good, and is under observation to ascertain its keeping powers when not hermetically sealed. These powders can be cheaply packed and transported, and they utilize every scrap of possible food contained in raw fish of perhaps six times the weight, while their keeping qualities are considerable, especially when compressed into tablets. Attention is also being devoted experimentally to the curing of fish and to pickling mackerel and sardines in air-tight barrels.

The Madras Government has established at Tuticorin, at the extreme south of India, a fish farm, where oysters, pearl oysters, chanks, etc., will be grown and their suitability for growth in captivity studied. Certain important and probably lucrative researches will also now be possible as regards the breeding of chanks and the development of pearls in the pearl oyster.

TRANSPORTATION OF FRESH FISH.

Experiments were made with Henderson's method of transporting fresh fish over long distances, whereby it was demonstrated that fish can be shipped without ice and kept in perfectly good condition even on the hot plains of South India for periods extending to three days. This has not only opened up a new and vast field for the products of the coast fisheries of South India, but has added materially to the food supplies available to inhabitants of the interior.

PEARL FISHERIES OF THE BAHREIN ISLANDS.

The Bahrein Islands are a small archipelago on the western side of the Persian Gulf, which, although adjacent to territory under the control of Turkey, is governed by an independent sheik under special British protection, the British Government maintaining a political agent there. The pearl fisheries under the control of the sheik, may, in a good year, bring to his islands as much as \$2,500,000. Units of measurement in the sale of pearl-oyster shells are the rice bag and the coffee bag, according to agreement, which, on the average, hold 140 pounds and 175 pounds, respectively, of uncleansed shells. Adan shells weigh from 4 to 7½ pounds per 100, and those from other banks from 3 to 5½ pounds per 100. It is estimated that about 2,000 tons of oyster shells are shipped annually to London and elsewhere. The Persian Gulf pearl-oyster shells are known as Linga shells in the London market. No reliable statement can be given regarding the average number of pearls found in a given quantity of shells. According to the reports from Bahrein, the value of pearls exported is about twenty times greater than that of the shell. The mother-of-pearl and mussels are sought for the sake of the shell alone, but the pearl oyster is gathered for the pearls and the shell is considered as only a by-product.

MINES AND MINERALS.

The feature that stands out most prominently in a survey of the mineral industries of India is the fact that until recent years little had been done to develop those minerals which are essential to modern metallurgical and chemical industries, while most striking progress had been made in opening out deposits from which products are obtained suitable for export, or for consumption in the country, by what may conveniently be called direct processes. In this respect India of to-day stands in contrast to the India of a century ago. The European chemist, armed with cheap supplies of sulphuric acid and alkali, and aided by low sea freights and increased facilities for internal distribution by the spreading network of railways, had been enabled to stamp out, in all but remote localities, the once flourishing native manufactures of alum, the various alkaline compounds, blue vitriol, copperas, copper, lead, steel, and iron, and seriously to curtail the export trade in niter and borax. The reaction against that invasion is of recent date. The high quality of the native-made iron, the early anticipation of the processes now employed in Europe for the manufacture of high-class steels, and the artistic products in copper and brass gave the country a prominent position in the ancient metallurgical world. As a chief source of niter India held a position of peculiar political importance until, less than 40 years ago, the chemical manufacturer of Europe found among his by-products cheaper and more effective compounds for the manufacture of explosives.

With the spread of railways, the development of manufactures connected with jute, cotton, and paper, and the gradually extended use of electricity the demand for metallurgical and chemical products in India has steadily increased. Before long the stage must be reached at which the variety and quantity of products required, now imported, will satisfy the conditions necessary for the local production of those which can be economically manufactured only for the supply of groups of industries.

THE KOLAR GOLD FIELDS.

By far the greatest part of the gold mined in India comes from the Mysore gold fields. Although these mines have been in operation for nearly 30 years, the output continues to keep up and, in several cases, seems more favorable than ever.

The gold mines of Mysore are located in the Kolar gold field district, which occupies a small tract of country about 60 miles from Bangalore, in the eastern part of the State. The field is connected by a short branch railway line with the main line of the Madras & Southern Mahratta Railway running between Madras and Bangalore. Power for working the mines is derived partly from steam and partly from the Cauvery Falls. Arrangements were recently made to increase

the electrical energy at present received by 7,000 horsepower, which would then enable the mines to do without steam power altogether.

UP-TO-DATE MACHINERY.

Most of the up-to-date crushing and extracting machinery is used in the surface workings.

All of the motors and other electrical apparatus used for operating the power for machinery have been imported from the United States, as has all other electrical equipment used in connection with the Cauvery Falls water-power scheme. There are at Kolar altogether 66 motors, aggregating 10,000 horsepower, connected to the central supply. Of these, 35 motors, aggregating about 1,000 horsepower, drive intermittent loads of various kinds, and 5 motors, aggregating 1,750 horsepower, operate winding plants and hoists. The use of electricity at these mines will be largely increased as soon as the new extension to the Cauvery Falls power scheme, which has just been started, is completed.

AIR COMPRESSORS—CRUSHING AND EXTRACTING MACHINERY.

The use of air compressors is a highly important feature of these mines, as it is only by reliance on them that the thousands of employees working at great depths below can secure air to keep themselves alive. Both American and British air compressors are used. The usual type runs at moderate speed with a final compression of 60 pounds to the square inch and delivering about 2,300 cubic feet of free air per minute. Such compressor has two stage cylinders, with a stroke of 48 inches, the air being taken into the low-pressure cylinder through a cooling chamber which reduces it about 8° below the temperature of the atmosphere. Improved cages have lately been introduced at the mines for rendering the handling of men up and down safer and more expeditious. Twenty men can be raised or lowered each trip. The brakes and reversing gear are actuated by steam. The cages, which can hold a gross load of 12,500 pounds, are double decked, run in wooden guides, and are fitted with safety catches and hooks.

All of the crushing and extracting machinery by the cyanide process is of British manufacture. These companies, with their large earnings, are progressive in expending money for improvements and do not hesitate to scrap machinery when a more efficient or suitable kind can be procured. For instance, the management of the Oore-gum mine, which has produced about \$10,000,000 worth of gold since it began operations, has expended \$125,000 on a complete reorganization of its milling plant, in order to get a closer separation of the fine ore and the coarse ore.

BRITISH COMPANIES—AMERICAN EQUIPMENT.

All of the mines in the Kolar gold region have been financed by British capital. The most important are those of the Mysore Gold Mining Co., the Champion Reef Gold Mining Co., the Balaghat Gold

Mining Co., the Gold Fields of Mysore & General Exploration Co., the Ooregum Co., the Tank Block Mine Co., and the Mysore Southern Extension Syndicate. Among these mines the Mysore gold mine, owned by the first-named company, is said to have been the richest single producer among the quartz mines of the world, about \$72,000,-000 worth of gold having been extracted from its ore since the company's inception.

The coal for operating the mines comes mostly from Bengal and Australia. The heavy timber required for supports is brought in mostly from the Malabar Coast. Nearly 1,000,000 pounds of candles are required each year for the underground workings; these are imported from Burma. As is usual in most mining communities, there is considerable local use of hardware and canned provisions, but most of such articles, except a limited number of tools and canned fruit and salmon from the United States, are imported from Great Britain.

MANGANESE.

India now takes first place among the manganese-producing countries in the world. The most important deposits occur in the Central Provinces, Madras, Mysore, and central India, the largest supply coming from the Central Provinces. In 1913 the Indian output increased by one-half, being 637,391 tons, compared with 423,464 tons in 1912; but it was still below the record year of 1907, when the Russian output fell away by reason of the war with Japan and there was a greater demand for Indian ores. In 1913-14 the United Kingdom took the largest portion, 258,776 tons, valued at \$1,362,620, Belgium coming next with 187,821 tons, valued at \$1,038,187, and the United States third, with a demand for 106,327 tons, valued at \$519,093, as against 168,600 tons, valued at \$811,083, in 1912-13. Other buyers were France, Japan, and Holland.

MICA.

The mica mined in India belongs entirely to the muscovite variety. The two principal areas of production are the Nellore district of the Madras Presidency and a portion of the Province of Bengal. India has been for many years the leading producer of mica. In 1898 the Indian mica miners discovered that their waste dumps contained a large supply of the material required for the manufacture of micanite, in which thin films are placed together and molded in sheets, which are in demand for many purposes for which only the natural sheets were formerly used. There are probably about 14,000 people working in the mica mines of India, at a wage of from 4 to 20 cents per day.

The output of the Indian mica mines in 1913 was 43,650 hundred-weight. Among the producing districts are Madras, Behar and Orissa, and Ajmer-Merwara. The electrical industry, on which the mica market is so largely dependent, was little affected by the general industrial depression in Europe and contributed largely to a satisfactory result in the year's trade. An improvement in mica mining methods has been adopted, a deeper and more systematic working replacing the older superficial character of the mining. The uncertainty as to the depth of the deposits is being gradually dissipated. This fact is lending stability to the industry and is encouraging

capitalists to make permanent provisions for future workings. Labor-saving devices are being introduced to supplant the old-fashioned methods of raising rock and water by manual labor. Hand drilling continues to find favor with the operators and is unlikely to be superseded by mechanical means on account of the fear that drills might damage the crystals, but there is no doubt that the use of double-handed drills would effect greater speed.

COPPER, TUNGSTEN, CORUNDUM, RADIUM, AND URANIUM.

The output of copper ore in India is about 9,000 tons, the production being entirely from one mine, the Rakha mine of the Cape Copper Co. in Behar and Orissa Province.

Tungsten and tin ores have been discovered practically all over the Tavoy and Mergui districts in Burma, and a large number of concessions are being worked. Wolframite is the main object of exploitation. Little lode mining has as yet been done. The concentrates resulting from the work on float deposits of wolframite are very rich and sell well. Tin occurs in practically negligible quantities in the lodes. The natives work the deposits with pan, sluice box, and rocker, and earn up to 48 cents per day. No doubt a great many improvements can be introduced for exploiting the float ores, notably hydraulic mining with power pumps, but so long as the extent of such areas remains unknown up-to-date methods will not be tried.

In response to inquiry from the United States as to the possibility of obtaining brown corundum ore in India, such as has been shipped in small quantities, it is said, to Glasgow, Scotland, and there crushed and reshipped to the United States, it may be mentioned that the Native State of Mysore is the only part of India where this metal is known to exist in any paying quantity. Mysore officials have made the suggestion that the industry might be considerably developed if American buyers would supply information as to the amounts they would require annually; they would also like specifications from American manufacturers as to machinery and plant required for crushing and cleaning this material, only a small plant producing about 100 tons a year being required at first. For the past two years from 100 to 200 tons of uncleared corundum has been produced annually in Mysore. Considerable quantities of hard rock containing corundum are not treated at present for lack of a suitable plant. Among the numerous varieties of corundum in Mysore, some might be described as brown corundum. The bulk of the material is gray corundum.

Mining for pitchblende, which is the chief source of radium, has been started on the Singar estate in the Gaya district in Behar and Orissa Province in northeastern India. Both pitchblende and uranium ocher have been known for many years to occur at the Singar mica mines. The pitchblende occurs in a pegmatite which has a width of 40 yards. Tourmaline crystals are found in large quantity. In the deeper pits nodules of pure pitchblende have been found.

It has been decided to form a radium syndicate to acquire the option of taking up mining rights over an area of 5 square miles, the option to be for a period of one year from July 1, 1914. If the expectations of the syndicate are realized India will become the home of an industry of first importance to the scientific and medical world.

PRECIOUS STONES.

[By Consulate General of Calcutta.]

The precious and semiprecious stones mined in India are the diamond, ruby, sapphire, spinel, tourmaline, garnet, rock crystal, and various chalcedonic forms of silica, jadeite, and amber. The ruby and jadeite are the only stones produced in India of considerable value. Large quantities of turquoise come from Sikkim and Tibet, that from the latter country being harder and of darker blue, which gives it greater value. The diamond industry is very limited, and is carried on in the Madras Presidency and the Central Provinces.

The celebrated Burma ruby mines are located at Mogok, in Upper Burma. Next to petroleum this is the most profitable of the mineral resources of the Province, the value of the product being about \$500,000 annually. One ruby of 77 carats, taken out a few years ago, was valued at \$133,330.

Sapphires used to be mined in Kashmir, but the mines are now said to be exhausted. The yellow, white, blue, and green varieties of sapphire are found in the ruby-bearing gravels in Burma. The spinel is found in considerable quantities in Burma. Beryls, found to some extent, are generally so fissured as to be of little value. Tourmaline (rubellite) stones of blue, green, and black covering are found in Upper Burma. Garnets are mined in Kishangarh, Jaipur State. Rock crystal, cut for cheap jewelry, known as vallam diamonds, is found in Tanjore, Madras Presidency; but another quartz crystal found in Kalabagh is cheaper, and is used for making necklaces.

Chalcedonic silica, known in India as hakik, and embracing many forms of agate, is mined in the Deccan. Agates and carnelians are cut and prepared for market at Cambay, Bombay Presidency. The agates come mostly from the State of Rajpipla. Large quantities are shipped to Europe and to China.

Jadeite of beautiful green veins is found in Upper Burma, and an inferior jadeite is also found in other parts of India. This stone sells for \$50 to \$100 per hundredweight of 112 pounds. In cutting there is considerable waste, yet the profit is satisfactory.

COAL.

[Indian (Government) Trade Journal.]

The latest official statistics of India's coal production and trade relate to 1913, in which year the industry suffered to a certain extent from floods, fires, and lack of labor; there was also some shortage of railway cars, caused by the great demand for fodder transport.

In spite of these adverse influences it is interesting to note that the total production in 1913 amounted to 16,208,000 tons, or about 10 per cent more than in the preceding year. To this may be added some 324,000 tons estimated to have been taken out from the mines by workmen for their own use. The actual production in 1913 would thus come to 16,532,000 tons, but for purposes of comparison the figure of 16,208,000 tons first stated must be adopted.

The total estimated value of the output in 1913 was 570 lakhs of rupees (\$18,492,700) as against 496 lakhs (\$16,091,900) in 1912.

AVERAGE VALUE AND COST OF PRODUCTION.

The value of the coal produced in India is reported annually by mine owners. It represents the actual or estimated wholesale price of coal at the pit's mouth. The average value, as thus defined, of all the coal produced in India in 1913 was 3 rupees 8 annas (\$1.13), the same as in 1907 and 1909. The lowest value, namely, 2 rupees 8 annas (\$0.81) per ton, was that of 1905, and the highest, 3 rupees 15 annas (\$1.27) that in the boom of 1908, when demand kept ahead of supply. The coal now being worked in India is near the surface and labor may be said to be cheap. Indian coal, therefore, has a lower value at the pit's mouth than the coal of any other country.

The cost per ton of production in India varies considerably in the different coal fields. The variation in the Raniganj field is from 1 rupee 14 annas to 2 rupees 8 annas (\$0.60 to \$0.81) and in the Jherria field from 1 rupee 8 annas to 2 rupees (\$0.48 to \$0.65). In the Giridih field the cost is stated to be about 2 rupees 4 annas (\$0.73) per ton. In the fields of Central India and the Central Provinces the rate varies from 2 rupees 8 annas to 5 rupees 10 annas (\$0.81 to \$1.82) per ton, while in the Punjab much higher rates prevail.

LABOR EMPLOYED BY COAL-MINING INDUSTRY.

Coal mining employs more labor than any other mining industry. In 1913, 144,966 persons were employed and were distributed among the various Provinces as follows:

Provinces.	Men.	Women.	Children.	Total.	Per cent of total
Bihar and Orissa.....	52,321	33,279	1,852	87,452	60.3
Bengal.....	25,106	12,966	489	38,561	26.6
Hyderabad.....	7,817	2,211	.....	10,028	7.0
Central Provinces.....	2,067	573	44	2,684	1.9
Assam.....	1,973	458	47	2,478	1.7
Central India.....	1,253	340	.....	1,593	1.1
Baluchistan.....	1,071	.....	16	1,087	.7
Punjab.....	873	.....	19	892	.6
Rajputana (Bikaner).....	161	24	.....	185	.1
Northwest Frontier Province.....	6	.....	.....	6	.....
Total.....	92,648	49,851	2,467	144,966	100.0

The great proportion of those employed are the aboriginal Dravidians from the mountainous country of Chota Nagpur and the Central Provinces, but other castes are employed in large numbers, particularly in the outlying fields. The majority of the workmen follow the vocation of agriculture as well as mining and return to their homes during the periods of sowing and reaping, the result being that, at such times, the output of many of the mines is greatly restricted. The output per person in 1913 was 111.8 tons when computed on the basis of those employed above and below ground and 172.2 tons for only those employed underground.

GROWING USE OF ELECTRICITY AND MACHINERY.

The use of electricity in the coal fields is extending—though capable of further utilization, particularly for haulage and pumping—and the employment of mechanical coal-cutting appliances will be necessary where the seams are narrow and remote from the surface. The use of machinery, particularly during the last 10 years is rapidly extending. At the large collieries modern plants of good design are now the rule rather than the exception. At the smaller mines, however, there is much need of improvement.

The total available supply of coal in India is arrived at by adding imports to the total production and subtracting exports therefrom; in 1913 the figure stood at 16,094,000 tons as compared with 14,368,000 tons in 1912 and 11,797,000 tons five years ago. Calcutta uses Bengal and Bihar and Orissa coal exclusively. The Province of Bihar and Orissa is self-supporting. Bombay derives its main supplies from Bengal, Bihar and Orissa, and Hyderabad; foreign coal is also brought in by sea. Sind and Madras import most of their coal by sea from Bengal, but the latter Province also draws part of its supply from Bihar and Orissa and Hyderabad. Assam, the United Provinces, the Punjab, Central Provinces, Rajputana, and Central India import the bulk of the coal they require by rail and river from Bihar and Orissa and Bengal. Most of the coal consumed in Mysore comes from the Bengal and Bihar and Orissa mines; Burma gets its supply almost wholly from the same fields.

COAL CONSUMPTION OF VARIOUS INDUSTRIES.

The statement below gives an estimate of the coal consumed during 1913 in the various industries, etc., but the figures can be regarded only as approximate, and in the case of some of the heads they represent a very rough estimate:

Industries.	Tons.	Per cent of total.
Railways (including railway workshops).....	5,001,000	31.1
Port trusts.....	161,000	1.0
Bunker coal.....	1,083,000	6.7
Inland steamers.....	605,000	3.8
Jute mills.....	769,000	4.8
Cotton mills.....	1,171,000	7.3
Iron and brass foundries.....	780,000	4.7
Tee gardens.....	145,000	.9
Brick and tile manufacture.....	1,135,000	7.0
Consumption at collieries and wastage.....	1,621,000	10.1
Other forms of industrial and domestic consumption.....	3,643,000	22.6
Total.....	16,094,000	100.0

^a Figures are for the official year 1913-14.

The railway consumption of Indian coal averaged 33 per cent of the total quantity of coal produced in India in the 10 years ending 1899, 30 per cent in the 10 years ending 1909, 32 per cent in 1910, 33 per cent in 1911, 31 per cent in 1912, and 29 per cent in the year ending March 31, 1914. The consumption of coal in relation to the total mileage of Indian railways for the official year 1913-14 was 144 tons per mile.

JOINT-STOCK COMPANIES.

The growth of the coal-mining industry may be roughly gauged from the following table, showing the number of joint-stock companies and their total paid-up capital:

Years.	No.	Paid-up capital.	Years.	No.	Paid-up capital.
1905-6.....	48	\$7,786,400	1910-11.....	129	\$23,391,600
1906-7.....	66	8,435,300	1911-12.....	128	23,424,100
1907-8.....	115	14,015,500	1912-13.....	130	23,229,500
1908-9.....	125	21,347,700	1913-14.....	143	23,521,400
1909-10.....	128	23,716,000			

The total amount of capital employed in the coal-mining industry can not be stated, as reports are received from joint-stock companies only, and the capital employed by private individuals and syndicates is not known. There were 129 joint-stock companies at work in Bengal and 4 in Bihar and Orissa on March 31, 1914. These companies accounted for 76 per cent of the total output of the Bengal and Bihar and Orissa coal fields in 1913.

IMPORTS OF FOREIGN COAL.

The entire quantity of coal imported into British India, including coke and patent fuel, amounted to 559,190 tons, or, adding 204,868 tons for the Government, 764,000 tons. The quantity imported in 1913 was 653,694 tons, or about double the imports of 1911 and 1912; but 1912 was exceptional, in consequence both of the high prices of English coal and the depression of the cotton-manufacturing industry in Bombay, where most of the coal is consumed. The year 1912-13 was also abnormal on account of the congestion on Indian railways, which resulted in supplies being obtained outside of India. In connection with the coal trade these facts should be borne in mind; most of the coal is required for Bombay and Karachi, and, with the conditions of transport, which still exist in India, are about as easily supplied from Cardiff as from Calcutta. Some of the imported coal is required for special purposes, being of a quality not produced in India.

PETROLEUM.

It is announced that during the year 1915 the Geological Survey of India will make special inquiries into the petroleum resources of the Punjab, Northwest Frontier Province, and Baluchistan. The petroleum beds of these parts have never been examined minutely, but much is known about them.

The records of the Geological Survey show that the petroleum resources of India are confined to the two systems of folded rocks at either end of the Himalayas, namely, (1) the Iranian system on the west, including the Punjab and Baluchistan and continuing beyond British limits to Persia, and (2) the Arakan system on the east, including Assam and Burma, with their southern geotectonic extension to the highly productive oil fields of Sumatra, Java, and Borneo. In both areas the oil is associated with Tertiary strata,

but there, so far as present knowledge goes, the similarity between the two oil fields ends. The great resources of the Burma wells, and of the Assam oil fields behind them, are well known; but the superficial knowledge already available regarding supplies in the northwest points to the conclusion that what may be found there will hardly compare favorably with the liquid wealth farther east.

HOW DEPOSITS ARE SITUATED.

The petroleum occurs in loose-textured conglomerates and sandstones, its distribution in which is similar to that of water in porous strata, being retained—as in the Burma area—by impervious beds of clay. It may exude through any accidental fissure at the surface of the earth and thus form natural oil springs, but is chiefly obtained by boring through the impervious covering strata into the oil sands below, from which the oil may be raised by pumping.

The great difference between the oil fields of Burma and those of the northwest appears to be that whereas in Burma the conditions for the retention of the oil have been ideal, in the northwest they are exceedingly wasteful. In Burma the clay beds have retained the oil until the impervious layers were pierced by artificial wells. Such natural reservoirs appear not to exist in the northwest.

Practically the whole production is in the hands of two Scotch companies, the Burma Oil Co. and the Indo-Burma Petroleum Co. The American standard rig is used for drilling; most of the pumps, engines, tools, and pipes are American and are operated by American drillers and field managers. In 1913 a dozen American operators, including experienced drillers and field men, were in one party that went from the United States to Burma.

INDIA THE SEVENTH PRODUCING COUNTRY.

India's position in the world's production of crude petroleum is shown in the following table. The statistics are for 1913, by countries, in barrels and metric tons, with percentage of total production for each country for the year.

Countries.	Production.		
	Barrels.	Metric tons.	Percent-
			age of total.
United States.....	248,446,230	33,126,164	65.12
Russia.....	60,935,482	8,124,731	15.97
Mexico.....	25,698,291	3,426,172	6.74
Roumania.....	13,554,768	1,885,225	3.53
Dutch East Indies.....	11,968,857	1,534,223	3.14
Austria.....	7,818,130	1,087,286	2.05
India.....	7,500,000	1,000,000	1.98
Japan.....	1,942,009	258,934	.51
Peru.....	1,857,355	247,647	.49
Germany.....	995,764	132,769	.27
Canada.....	228,080	30,410	.06
Italy.....	50,334	7,000	.01
Other countries.....	517,616	69,015	.13
Total.....	381,508,916	50,920,576	100.00

Note: These statistics do not include the oil production from shale in Scotland, which exceeded 2,000,000 barrels in 1913.

PRODUCTION OF INDIAN PROVINCES.

The extent to which the different Provinces contributed to India's petroleum output during the six years ended December 31, 1913, is set forth below, in imperial gallons (1 imperial gallon = 1.2003 American gallons):

Provinces.	1908	1909	1910	1911	1912	1913
Burma.....	<i>Gallons.</i> 173,402,790	<i>Gallons.</i> 230,396,617	<i>Gallons.</i> 211,507,903	<i>Gallons.</i> 222,225,531	<i>Gallons.</i> 245,335,209	<i>Gallons.</i> 272,885,397
Eastern Bengal and Assam.....	3,243,110	3,280,750	3,320,680	3,565,163	3,747,359	4,688,628
Punjab.....	420	720	1,064	1,400	950	1,200
Total.....	176,646,320	233,678,087	214,829,647	225,792,094	249,083,518	277,555,225

EXPORTS OF MINERAL OIL.

While, as already shown, India is an important producer of crude petroleum, the export trade is of comparatively little moment, over 90 per cent of the domestic production being consumed within the Empire. Although there was an actual increase of nearly 1,000,000 imperial gallons in the shipments during 1913-14 over those of 1912-13, the proportion of exports to the total output was a trifle less, being 8.04 per cent against 8.63 per cent in the earlier year. However, in 1911-12 oil exports formed but 6.56 per cent of the year's production.

An interesting feature of the export trade in 1911-12 was the shipment of 2,154,678 gallons of petroleum to Atlantic coast ports of the United States, the first sales of this nature of which there is official record. The following year saw no cargoes destined for that country, but the next year (1912-13) witnessed shipments of 2,920,444 gallons. The other leading purchasers of Indian oil during the three years named were (imperial gallon = 1.2003 United States gallons):

Countries.	1911-12	1912-13	1913-14
United Kingdom.....	<i>Gallons.</i> 7,516,094	<i>Gallons.</i> 15,818,293	<i>Gallons.</i> 15,268,640
Other British possessions.....	2,181,780	83,241	114,433
Germany.....	5	954,392	922,586
Netherlands.....		4,829,297	3,066,663
Bumatra.....	2,986,535	-----	83
United States.....	2,154,678	-----	2,920,444
All other countries.....	10,097	12,241	15,828
Total.....	14,819,189	21,497,464	22,308,692

The advance in value of these exports, from \$452,239 in 1911-12 to \$679,299 in 1912-13 and \$694,595 in 1913-14, may be ascribed to the increased demand abroad for petrol (gasoline) for motor vehicles.

IMPORTS OF KEROSENE, LUBRICATING, AND FUEL OIL.

The following table gives the quantities and principal countries of origin of kerosene in bulk, kerosene in cans, lubricating oil, fuel oil,

and dangerous petroleum imported into British India in 1911-12, 1912-13, and 1913-14, in imperial gallons (imperial gallon = 1.2003 United States gallons):

Mineral oil.	1911-12	1912-13	1913-14
Fuel oil.....		Gallons.	Gallons.
Straits Settlements.....	13, 216, 845	11, 085, 936	7, 786, 680
Sumatra.....	3, 328, 250	1, 383, 957	1, 423, 154
Dutch Borneo.....	914, 853	2, 055, 774	1, 456, 264
Kerosene:			
In bulk.....	56, 984, 494	52, 253, 974	52, 975, 622
Straits Settlements.....	2, 055, 165	2, 776, 735	2, 195, 536
Russia.....	1, 873, 680	12, 489, 405	1, 079, 209
Dutch Borneo.....	13, 333, 781	12, 547, 029	20, 815, 283
United States.....	39, 721, 368	18, 614, 293	26, 594, 240
In cans.....	22, 428, 210	13, 382, 543	15, 874, 351
United States.....	22, 420, 338	13, 282, 239	15, 716, 581
Lubricating oil.....			
United Kingdom.....	12, 257, 199	15, 256, 585	14, 952, 931
Straits Settlements.....	3, 131, 062	2, 730, 144	2, 600, 018
Germany.....	460, 030	118, 230	148, 215
Belgium.....	54, 142	119, 627	125, 657
Sumatra.....	126, 817	132, 493	118, 803
Dutch Borneo.....	1, 106, 740	1, 931, 412	408
United States.....	691, 319	675, 780	3, 100, 841
Petroleum, dangerous.....	6, 636, 283	9, 460, 030	8, 806, 493
United States.....	205, 782	50, 313	36, 875
All other.....	205, 587	49, 226	36, 608
Total, mineral oils.....	2, 322, 159	3, 232, 012	3, 415, 997
	107, 416, 529	95, 262, 006	95, 023, 073

GLASS MANUFACTURE.

Glass manufacture in India consists of two well-defined branches, the indigenous household industry and the modern factory industry. The indigenous household industry, which is represented in all parts of the country, is chiefly concerned with the manufacture of cheap bangles. These are of plain coarse glass colored in a variety of shades and often overlaid with lac and ornamented with tinfoil and beads. They scarcely compete at all with the imported bangles and are worn only by the poorest classes.

There are, however, possibilities of improvement in the local manufacture of bangles, as is illustrated by the Ferozabad glass and bangle industry in the Agra district. Ferozabad is the center of manufacture both of crude glass (kanch) and of bangles in the United Provinces. The war presented a unique opportunity for the bangle makers of these Provinces to capture some portion of the trade formerly held by Austria and Germany, but they found themselves hampered by difficulties in obtaining the colorants required for continuing their business at all. The two principal colorants are bichromate of potash and oxide of cobalt. The raw material for the manufacture of both exists in India in the shape of chromium in Baluchistan and a cobaltiferous earth known as "sehta" in the Khetri estate (Jaipur). The manufacture of the former has been undertaken by a Cawnpore firm, and the experimental work is promising. There seems every reason to believe that, provided the initial difficulties of freight on the raw material can be overcome, an industry can be built up in these Provinces. As regards the latter, Government chemists have shown that there is no great difficulty in manufacturing a suitable colorant from it, and bangles of excellent color have, in fact, been made. The authorities at Khetri are desirous of refining the cobalt on the spot.

The manufacture in indigenous furnaces of articles of blown or pressed glass from kanch or from broken glass (purchased usually from the railways) is carried on in various parts of India—for instance, at Nagina, in the Bijnaur district—but the output consists mainly of phials. Inkpots, perfume phials, and some other articles are also made, but the industry can hardly be said to compete with imported glassware except of the very lowest grade.

MODERN PLANTS.

The history of glass manufacture in India on the modern factory system has been an uphill struggle against great difficulties, and at present only one or two glass factories are said to be working in India, and a new factory is about to begin work.

Records of the earlier ventures have shown that failure in some cases was due, in part at least, to preventable causes, prominent among which were (1) the lack of sufficient fluid capital and the

consequent inability of the companies to meet their heavy initial expenses, and (2) inexperience and lack of technical knowledge on the part of the promoters. But there are also certain real and special difficulties with which glass manufacturers in India have to contend. The chief difficulties are:

(1) The temperature of India in summer. Foreign experts have failed hitherto mainly in being unable to accommodate themselves to Indian conditions and to regulate the furnaces to suit those conditions.

(2) Difficulty of obtaining skilled labor for glass blowing.

(3) There are considerable technical difficulties, such as the supply of a suitable quality of sand and a suitable alkali. Suitable sands exist in various places in India. With regard to the alkali, local sources, such as the reh of northern India, have not yet given results adequate for the manufacture of high-class glassware. At present imported bicarbonate of soda is mainly used, but it is probable that soda compounds will in time be manufactured in India.

IVORY AND ELEPHANTS.

The carving of ivory is an important industry in some parts of India, and the statistics of export trade apparently fail to show its true importance, as carved ivory is bought to a great extent by tourists, who take it away with them without its export being recorded at the various shipping ports; moreover, carved ivory is often incidental to other articles classed as jewelry, furniture, brushware, etc. There is a large local purchase of ivory articles by well-to-do natives of the country.

The principal centers of ivory carving in India are the Native States of Mysore and Travancore in southern India, Burma, the town of Murshidabad, in Bengal, and Delhi, the new imperial capital. The craftsmen of these places, with the exception of those of Burma, all use African ivory in preference to that of India or Ceylon. The reason for this is that African ivory is closer in the grain and not so liable to turn yellow and appears to be a superior article in many ways; the general opinion of experts is that the quality of this ivory is due almost entirely to the better food of the African elephant.

VARIOUS USES OF ELEPHANTS.

Although ivory is obtainable from Indian elephants, the greater part of the ivory manufactured in India is imported from Africa. The Indian elephants have important uses, both for display by natives of rank in processions, for assisting in the movements of troops, for transporting timber from the forest to river banks, and for shooting purposes, etc., but the production of ivory is not their specialty.

Wild elephants are found in most of the large forests of India, from the foot of the Himalayas to the extreme south of the Indian Peninsula, and throughout the Peninsula to the East of the Bay of Bengal into Burma and Siam. They are also found in Ceylon. There is said to be only one species of elephant throughout these tracts. In the Native State of Mysore in southern India, they seem to be especially numerous, as shown by the fact that during the visit of the Viceroy of India to that State in November, 1913, there was an elephant drive, at which about 130 were caught, of which number 24 were later invoiced at the American consulate at Bombay for shipment to the United States for circus purposes. The declared export return of these elephants at this consulate showed prices ranging from \$166 for a baby elephant, 3 feet high, up to \$583 for a female elephant, 5 feet 3 inches high. Most of the consignment averaged about \$500 each in price, and the total of the 24 elephants cost altogether \$11,757.

TUSKS NOT ALWAYS SOLID.

The largest tusks of Indian elephants measure not over 4 or 5 feet in length, outside curve, and about 16 inches in circumference at the gum, and weigh about 74 pounds. The tusks, except those of very aged elephants, are only solid for a portion of their length; the hollow is filled with firm, bloody pulp. In young animals the tusks are only

solid for a portion of their length even outside the gum, and are hollow throughout the embedded portion. With age the pulp cavity decreases in depth, till, in very old animals, it becomes almost obliterated.

ELEPHANTS GOVERNMENT PROPERTY.

The Government of the State of Mysore has issued a notice that all ivory in the shape of elephants' tusks in that State shall be sold by public auction by the district treasury officer at Bangalore, in convenient lots, once every year. A tusk or a portion of a tusk may be sold in retail between any two auctions, with the approval of Government, at the highest rate secured at the last previous auction sale. In all India wild elephants are considered Government property, and permission to hunt them, if obtainable at all, is only effected by payment of heavy license fees, and even then there is much restriction. In fact, wild elephants enjoy immunity in India, except for occasional captures for Government purposes.

ELEPHANTS FOR PAGEANTRY AND FOR UTILITY.

Commercially, elephants in India come under two classes—the one of pageantry, the other of utility. Every native prince or nobleman of distinction in India keeps elephants to swell his retinue, while Government officials and private persons, such as timber contractors, etc., require them for work. For court display and temple processions perfection of form and carriage is the paramount consideration, but for economic purposes strength and docility are the main requirements. The tuskers, or male animals, are far more valuable for work than females, not only from their greater strength but from the good use they make of their tusks in turning and carrying logs, etc.

Elephants are used by the Government for the transport of troops, for provisioning outpost stations which are not connected by roads, etc. The progressing development of roads and railways in India may be expected to do away with the necessity for the services of some of these animals in the most accessible localities, but it will always be necessary to keep a certain number in case of movements in rough and uncivilized districts. In some instances traction engines are now used, where elephants were formerly employed, as in the transportation of heavy machinery over districts where there are no railways.

For draft elephants are very valuable, as logs can be brought by their aid from localities where they would otherwise be inaccessible. The elephant's power is most advantageously employed where a great exertion is required for a short distance through a limited space of time. When elephants are harnessed, the dragging rope is attached either to a collar around the neck or to a girth behind the shoulders. In Ceylon the use of elephants for industrial purposes is very common and always attracts the interest of visitors. As a beast of burden the elephant can scarcely be considered satisfactory in all respects, chiefly from his liability to gall under such heavy weights as he is otherwise able to carry. An elephant well packed will carry an immense bulk and weight, half a ton being considered a load for an elephant for continuous marching, and in difficult country, especially hilly or swampy districts, its place can not be taken by any other means of carriage. For transporting light guns in mountain warfare it is invaluable.

EGRET FARMING.

The Journal of the Bombay Natural History Society (Vol. XXIII, No. 1) contains an interesting account by Mr. George Birch, assistant commissioner of the Province of Sind, India, of the breeding in captivity with marked success and on an extensive scale of egrets, from the plumage of which ospreys are plucked without injury to the birds in the same way that feathers are plucked from the ostrich.

It is stated that there is ample evidence to indicate that the birds breed freely in these conditions of modified captivity. Inquiries show that under these conditions birds assume their nuptial plumage four times a year, twice in summer and twice in winter. The summer plumage is comparatively poor, barely half that of the winter plumage. The breeding season commences early in March and continues to the end of September. As soon as it begins the birds break up into couples; twigs are strewn about the cage and each pair of birds builds a nest. The birds hatch their own eggs, which are jealously guarded, the male bird invariably taking the place of the mother bird when she leaves the nest for food or exercise. The young are permitted to remain with the parent birds for about a week, when they are removed and reared by hand. The couple meanwhile begin to breed again. The number of times the birds breed during this period depends on the degree of vitality of each pair. Eggs are laid never less than twice during the season and sometimes as many as four or five times. The number of eggs each time varies from three to five. It takes about 12 months for a bird to reach maturity.

The birds are given a liberal supply of food, consisting of small freshwater fish, which are laid about in shallow earthen platters. Plenty of perches are provided and quadrangular structures of reed mats as for ordinary poultry runs. The birds are said to be quite tame and allow themselves to be seized without showing fear. One village visited by the assistant commissioner contained about 1,000 egrets in captivity, about 50 birds on the average being in one inclosure.

THE INDUSTRY SPREADING—CRUELTY PRACTICED.

It is said that the ease with which the egrets are bred, the fruitful crop of plumes yielded by the bird, and the high prices which they command are causing the industry to spread very rapidly in the neighborhood of the inland waters of the Province of Sind, and it may be predicted with safety that in a few years, if the demand for the plumes continues, every fishing village in the interior of the country will have its egret farm. The trade in plumage of birds of the egret and heron species has always existed in Sind, but the methods formerly followed were quite different, and the trade never attained large dimensions. The practice followed until about three decades ago was to snare the birds and destroy them for their plumage. On this being stopped by executive orders of the commissioner in Sind, the practice of snaring the birds and keeping them in captiv-

ity was resorted to; but this led to the infamous custom of stitching up the birds' eyes with the object of preventing them from escaping. This practice is now rigorously suppressed under the prevention of cruelty to animals act, and these orders have proved an important factor in the inception of this new system of egret farming.

The assistant commissioner of Sind says that in view of egret farming being a humane and entirely legitimate industry the Government of India must sooner or later modify its notification issued in 1902, which "prohibits the taking by sea or by land out of British India of skins and feathers of all birds other than domestic birds, except feathers of ostriches and skins and feathers exported bona fide as specimens illustrative of natural history."

PRICES OF PLUMES AND BIRDS.

The plumes from the egret farms in Sind are made up into small brushes, weighing from half a tola to a tola (5 tolas equal $2\frac{3}{5}$ ounces avoirdupois), and are taken to Karachi for sale, where the prices realized range from about \$3 to \$5 per tola. The plumes are then sent chiefly to Calcutta, whence they are said to be taken out of the country to the European markets, where prices ranging as high as \$75 per ounce can be realized. Not only has trade in the plumes been built up, but the birds themselves now command a high market value; birds three to four months old sell for about \$3 each, while full-grown birds command as much as \$30 per pair.

IMPORTANT NATIVE STATES.

MYSORE.

After conferring with some of the leading officials of the Native State of Mysore, India, I have been much impressed with the important recognition accorded to many articles of American manufacture and the disposition to seek expert advice from the United States relative to various industrial problems connected with the economic advancement of this State, whose government, under native control, is noted as being one of the most progressive in India. Owing to the specially friendly disposition on the part of the Mysore Government toward American manufactures and industrial methods, this State, in proportion to its size and population, offers one of the most encouraging fields in India for the development of trade relations with the United States.

The Maharaja of Mysore has set an interesting example to his subjects in his personal use and appreciation of certain articles of American manufacture. For instance, all the electrical installation of his highness's palaces at the cities of Mysore and Bangalore are of American importation. On public holidays these palaces are brilliantly illuminated on the outside by American electric lamps. A complete electrical cooking installation, manufactured at Chicago, was recently purchased for the government house at Mysore, and on his highness's last birthday dinner for 130 guests was successfully cooked on this apparatus. When his highness motors between these two leading cities of Mysore and Bangalore, 86 miles distant, to communicate while en route between his palaces and these cities he uses a portable telephone, manufactured for him at Chicago, this telephone being capable of attachment to any part of the American telephone line installed between the two cities.

AMERICAN MUSIC AND MOTOR CARS.

In the maharaja's palace at Mysore is a magnificent American organ, costing about \$30,000, which was manufactured especially for him at Salem, Ohio. Recently his highness made inquiry concerning American sheet music, and being much pleased with samples sent him from New York, at once ordered nearly \$1,000 worth of such music. His highness, who is a skillful musician himself, seemed delighted with the American tunes, especially the band music.

Of about 18 high-grade automobiles belonging to the maharaja, and used by himself and the ladies of the Royal Household, two are American steamer cars, and probably the proportion of American cars would be much larger had attention been drawn to the excellence of some of the American high-priced cars using gasoline and of a limousine type well curtained in. For ladies of the higher castes in India tradition and religious custom make it necessary for automobiles to

be well closed in. Practically all of the American cars on the Indian market, while enjoying a reputation for cheapness and being well worth the money, are not of the type that would appeal to the princes of India and their royal households, and it is to be regretted that high-priced American makes of cars, especially limousines, as used by the wealthiest people in the United States, have not been known in India, and thus have not obtained royal patronage.

AMERICAN HYDROELECTRIC EQUIPMENT.

The greatest long-distance power transmission in southern Asia is in this Native State of Mysore, power being transmitted from the Cauvery Falls to the Kolar gold fields, 92 miles away, and to the cities of Mysore and Bangalore, about 40 and 86 miles away, respectively, for electric lighting and power purposes. Nearly all of the hydroelectric installation for this great enterprise was made in Schenectady, N. Y., and the only imports connected with this work not from the United States were water wheels from Switzerland. An important extension to this enterprise has recently been started, and the contract for all machinery except water wheels has gone to the United States.

A large order has also recently gone to Pittsburgh for steel poles for the transmission system, to be used instead of wooden poles, which are susceptible to destruction by white ants. The important hydroelectric developments in the State of Mysore have always been in charge of American experts, whose work has given the highest satisfaction to the leading officials of the Mysore Government and to the industrial community generally. The present chief electrical engineer for the Mysore Government, Mr. C. F. Beames, is a citizen of New York, was formerly an employee of the General Electric Co., and has a wide experience in hydroelectric developments in the United States, Porto Rico, and Mexico.

VISITS OF FOREIGNERS TO THE UNITED STATES ARE PRODUCTIVE.

The Dewan (Prime Minister) of the State of Mysore (M. Visvesvaraya, Esq., C. I. E.) is an exceedingly well-informed Brahmin, and has enthusiastic aspirations for the industrial advancement of his State. He has traveled extensively and considers the visit he paid to the United States a few years ago the most instructive visit he had paid to any part of the world.

AMERICAN INDUSTRIALISTS ARE WELCOMED.

In conversation with the Dewan at his summer residence at Ootacamund he mentioned his earnest desire that American capitalists might take part in the economic development of his country, and, especially, establish local industries for utilization of local resources. He especially suggested that his Government would welcome the establishment of American industries in small towns to take advantage of cheap electrical power and the bountiful local supplies of timber, iron ore, mica, and asbestos. He stated that in his opinion there would be especially good openings in Mysore for factories making paper, matches, and glassware. He especially suggested

that the Government of Mysore would like to eradicate malaria and other preventable diseases by introducing American methods of sanitation and sanitary appliances, such as have been so successful in ridding the Panama Canal Zone of diseases which had previously caused a heavy mortality.

I was especially requested also to mention that his Government would like to obtain the services of an American expert in the commercial side of the lumber industry, so well developed in the United States, as the Mysore Government owns magnificent forests, which, if put under a businesslike management with up-to-date sawmilling machinery introduced, would be an asset of very great value to the State. At present, he said, the Government had been obliged to import ties for railways, as it could not wait for the timber to be provided from its own forests by the present slow method of hand sawing.

In complimenting the Dewan upon the progressiveness of Mysore, I was told that this was a mistake and that the country was really very backward through lack of suitable appliances and machinery, but that he hoped, by obtaining assistance from countries well advanced industrially, especially from the United States, and also by wider popular technical education and agricultural and mechanical schools, the State in time could become progressive in fact as well as in reputation.

OPENING FOR AMERICAN TRADE PAPERS.

The Dewan also states that his Government would like to subscribe for various technical and trade papers published in the United States and to receive catalogues concerning American machinery and other appliances suitable to this State. It will be the policy of his Government to follow closely developments and improvements in the United States, with a view to their introduction into Mysore whenever practicable. Communications to his Government concerning the matters mentioned, may be addressed to the Secretary of the Mysore Government, Bangalore, Mysore, India.

CHARACTER OF THE COUNTRY.

For the information of persons who may be interested in the State of Mysore as a promising field for American trade and enterprise, I would state that the area of Mysore is 29,475 square miles and that its population in 1911 was 5,806,193; length from north to south 190 miles, and width from east to west 230 miles. The general elevation of the country is 2,500 to 3,000 feet, but the hills bounding it on the south and east (Neilgherry Hills) attain 8,700 feet. One-third of the area of Mysore is cultivated, one-third is not suitable for cultivation, and the rest is forest, waste, or fallow. Wild elephants, tigers, and other wild animals are plentiful in the jungles.

Important features of the country are the 25,000 tanks, or water reservoirs, with a water spread of more than half a million acres, in which the monsoon rainfall is stored and held until required by the wet crops, such as paddy, sugar cane, and mulberry. The system of agriculture by irrigation would seem to offer good opportunities for the use of imported pumps driven by oil, steam, or wind power, to supersede the slow method of drawing up water with bullocks.

THE CITY OF BANGALORE—NEW ELECTRIC STREET RAILWAY.

Bangalore, the leading city of Mysore, has a population of about 100,000, and is about 215 miles due west of Madras, with which it is in direct communication by railroad. It has an elevation of 3,500 feet, which renders the climate much cooler and more salubrious than Madras. The city has a large cantonment for British troops, about 10,000 being stationed here, this being the most important military station of South India. The British officers over Indian troops are much better salaried than those over English troops and appear financially well able to purchase motor cars and motor cycles, and many in Bangalore are now using American motor cars. As the city receives cheap water power from the Cauvery Falls, it is making good industrial progress and has some flourishing cotton, woolen, and silk mills and tanneries. A large industrial farm for sericulture is operated near here by the Salvation Army, and there is also an important Government experiment farm and dairy near by. Bangalore is shortly to have a tramway with 10 miles of track, including sidings, to cost \$225,000.

INDUSTRIAL TRAINING—APPLICATION OF MACHINERY.

There are seven industrial schools in the State under Government control, and it is proposed to increase the number and efficiency of these as rapidly as possible, so that engineers and mechanics can be well trained for operation of the State's industries. In addition to gold mining, which is the most important industry of the country next to agriculture, there are a number of smaller industries, to some of which American machinery is already being advantageously applied in a few instances, such as in rice hulling and sugar-cane crushing. American drills are being much used for boring operations, and American plows are also gaining ground.

Mr. A. Chatterton, Director of Industries and Commerce in the State, has recently issued a bulletin on "The Encouragement of Private Enterprise in Mysore," in which he states a list of openings for the employment of simple machinery to be driven by steam, oil, or gas engines, or Cauvery Falls water power. These openings are for cotton ginning, cotton pressing, cotton spinning, cotton weaving, oil pressing, rice hulling, flour milling, bone crushing, coffee pulping, sugar-cane crushing, coffee roasting and grinding, silk reeling, paper mills, glass factories, match works, brick and tile making, lifting water, sawmills and woodworking, stone crushing, fiber extracting, and agricultural operations, such as plowing and thrashing.

It is also stated in this bulletin that the possibility of establishing more complex industrial factories is in most cases beyond the range of immediate practical action, but the following appear to be worthy of detailed examination in the hope that capital will be forthcoming to take them up when it can be shown that the prospects are favorable: Oil refining, soap making, wood distillation, tanning, iron foundries, malleable metal working, pottery manufacture, sugar refining, essential oil and perfume making, brewing and distillation of potable spirits, lac and varnish manufacture, and paint making.

BHOPAL.

The Native State of Bhopal covers an area of 6,902 square miles in central India and has a population of 700,000. It is a Mohammedan State. The ruler is the Begum (feminine of Nawab), who is actively interested in modern methods and appliances and their possible application to her country.

I had a very pleasant interview with Her Highness at the palace. As it was not proper for me to view her face, I talked with her through a screen. Her Highness asked me if I had any suggestions to make as to the improvement of economic conditions in her State. I ventured to suggest that the use of modern implements of agriculture, especially metal plows, might result in great benefit. The gist of Her Highness' observation was then as follows: No American manufacturer could expect to sell plows in her State unless they could give some demonstration of what the plows could do. Moreover, it was absurd to say that any particular American plow could be of general service to her State on account of the many different conditions of the soil. Different types of plows would be needed for different localities, and it was incumbent on American implement makers to show how their respective plows were suited to special conditions.

AGRICULTURE—IRRIGATION—STATE FARMS.

Agriculture in Bhopal is carried on by primitive methods; and, owing to this fact, as well as to famine and disease, the average area under cultivation is only 1,800 square miles, or 26 per cent of the area of the State. The average holding is 13 acres. Irrigation is general, though not fully developed, the sources used being wells and tanks. In the case of wells, which predominate, the water is usually drawn up by leather-bag lifts, the motive power being furnished by cattle, which in Bhopal are very strong and active. From tanks irrigation is effected by means of channels and gravitation. There are vast tracts of land in the State which could apparently be again brought into cultivation only by the establishment of State farms and by the introduction of outside labor and importation of machinery for irrigation and cultivation. The establishment of such State farms, or at least one as an experiment, is under consideration by the Begum and her ministers.

INDUSTRIES—CAPITAL CITY—EXPORTS AND IMPORTS.

The chief industries of Bhopal aside from agriculture are weaving and printing of cotton cloth, the making of jewelry, and preparation of a mixture of saffron, lime, and other ingredients eaten with betel leaf, of which the Bhopal variety is famous. There are three cotton-ginning factories, and a State cotton-weaving establishment is to be erected next year. At the State jail carpets and tiles are manufactured.

Bhopal, the capital city, which has a population of nearly 80,000, is noted for the great number of its mosques (164), of which 110 are supported by the State, 11 from the Begum's private purse, and 43 are private edifices. A great new mosque is in course of erection, which when completed will be the largest in India. There are also

52 Hindu temples and a Roman Catholic church. One of the finest buildings in Bhopal is the Lansdowne Hospital for women, which was built and is maintained at the Begum's expense.

The principal exports are wheat, gram, mustard seed, linseed, sesamum, poppy seed, opium, cotton, ghee (clarified butter), hay, gum, lac, tamarind, hides, bones, scissors for cutting betel nuts, honey, wax, and wood for building purposes. The principal imports are kerosene, sugar, salt, coconuts, betel nuts (arecanuts), catechu, tobacco, combs made of horn, pins, needles, knives, paper, pens, English shoes, caps, umbrellas, cloth, melons, plantains, and match boxes. The State is dependent chiefly on Bombay for distribution of imports and exports.

GOVERNMENT—PLANS FOR PUBLIC WORKS.

The Begum attends personally to the general policies of administration, with the assistance of her three sons. The second son commands the army of about 3,000 men. The State has a Judicial Minister and a Revenue Minister (also in charge of agriculture). The revenues are derived chiefly from land taxes and customs duties, principally the former, and show a slight tendency to increase. The Begum is her own Minister of Public Works, but has a chief engineer in active charge of the department.

The chief engineer states that the Government has under contemplation the development of some of its water-power resources for industrial purposes, and possibly for motive power for a light railway to extend in a circle around the State for about 200 miles. One source of water power is about 5 miles from Bhopal, where it is proposed to develop a combined irrigation and water-power scheme by erecting a dam 100 feet high, 300 feet wide, and 250 feet deep, and to make use at first of about 500 horsepower for factory and lighting purposes in Bhopal. Another dam about 18 miles from Bhopal would create a reservoir that would secure the water from a catchment area of about 250 square miles, with an average rainfall of 36 inches. Here 1,000 horsepower might with advantage be developed. The light railway proposed would have a 2 foot 6 inch gauge, and if found feasible might be operated at least part way with the water power developed. The cost of all these works might be about \$3,000,000, but no detailed surveys have been made.

The Department of Public Works has done considerable work in recent years in the construction of waterworks for Bhopal and suburbs, costing about \$600,000, and of roads and public buildings.

NEED OF AGRICULTURAL IMPLEMENTS.

The Begum stated in an interview that while she was anxious to introduce improved agricultural implements, she thought her subjects should first receive expert advice not only as to the different types of American plows, but also as to the kind of land that each type is specially adapted to work, and detailed information on the subject is greatly desired. The palace is being used as a school, and the Begum is translating English books on agriculture into Urdu, the language of the country.

BARODA.

While there is much friendly competition between certain of the progressive Native States of India as to which may be termed the model Native State of this Empire, it seems to be conceded that, in certain respects at least, Baroda, which occupies over 8,000 square miles in western India, about 12 hours' railway journey due north of Bombay, and with about 2,100,000 population, still holds the premier position for India, notwithstanding the imitation of some of its progressive economic policies by other enlightened Native States.

In popular education Baroda is the most advanced State in India. It is the only State in which primary education is both compulsory and free. On visiting the city of Baroda, population about 100,000, the capital of this Native State, I found that the Government of His Highness the Maharaja Gaekwar, who is notably in the forefront of progressive Indian rulers, seemed most anxious to cultivate friendly commercial relations with the United States and to encourage the introduction of American business methods and appliances such as might help promote the prosperity of the people.

AID RENDERED BY AMERICAN EXPERTS AND COLLEGES.

It was pointed out that this State already owed not a small amount of its advancement to Americans who had been in the employ of the Government. For some years Mr. R. C. Whitenack, an American citizen, had been the head of the Department of Commerce and Industry of Baroda. Another American, Mr. W. A. Borden, of New Haven, Conn., had been a most helpful adviser to the Government in connection with educational matters, and was the originator and organizer of Baroda's Central Library Department, which is noted throughout India on account of its useful educational influence. Mr. A. N. Datar, a graduate of Columbia University, had served most successfully as Accountant General of the State.

It has been the policy of this Government to send some of its most promising young men to the United States for their education and then to give them important positions in the Baroda Government. Mr. Manilal B. Nanavati, present head of the Department of Commerce and Industry, was sent to the United States in 1909 to study practical economics. Mr. Nanavati was a post-graduate student at the University of Pennsylvania. He then traveled for about four months, looking into different industries of the United States. Next he joined a bank in Washington as an apprentice for nearly six months. Then for three months he joined for short periods some of the leading banks and trust companies in the city of New York. On his return Mr. Nanavati was detailed to special duty to investigate and report on the agricultural indebtedness in the Baroda State. As a result the State has embarked upon a policy of encouraging the organization of agricultural credit societies. In 1911 he was made Director of Commerce and Industry.

Mr. L. L. Joshi, a graduate of Columbia University, is the head of Baroda College, while Mr. T. R. Pandya, also a graduate of Columbia, is the head of the General Educational Department of the Government, and Mr. P. M. Desai, another Columbia graduate, is principal of the Female High School at Baroda. A Harvard grad-

uate, Mr. Sen, is the present head of the Account Department. Mr. Pagar, a native of Baroda, is being educated in behalf of the Baroda Government in economics at the University of Wisconsin.

The Maharaja has also shown his appreciation of American universities by sending his eldest son, Prince Jaisingh Rao, to Harvard College, where he graduated in 1911. In conversation with him at Baroda I found that he was enthusiastically looking forward to returning in a year or so to the United States to attend the reunion of his class at Harvard. Her Highness the Maharani of Baroda, who is noted as one of the most cultured and progressive women of India, for some years had as her intimate companion Miss M. E. Mac-Lean, a graduate of the Yale Art School. The Maharaja himself is one of the few Indian princes who have traveled in the United States, and it is owing to several visits in this country, and the American acquaintances so made, that American influences have played such an important part in the remarkable development of his State.

GOVERNMENT ENCOURAGEMENT OF MANUFACTURES.

Among industrial enterprises which have been started in Baroda during the last several years, largely as the result of Government demonstrations as to their practicability and in some instances Government financial assistance to their organizers, may be mentioned a glass factory which turns out glass chimneys, tumblers, candle globes, and other articles of household use, and a brush factory which turns out a variety of brushes. A cottage industry is worked in this connection. Backs of brushes and bunches of hair and fibers are provided to a number of women who work in their own homes and return the work done. They are paid on the piecework system. A new stearin and glycerin factory has just been completed, the first of its kind in India. Candles have been manufactured with imported stearin. When the factory is working regularly for some time, it is likely that candle making will be established as a cottage industry. Several ice factories, two cotton gins, a cotton press, and also a cooperative cotton-ginning factory have lately been established. Mr. J. H. Benton, an American expert, was lately intrusted with making investigation regarding the possibilities of erecting oil mills and the manufacture of soap solvents and other products. One new oil-mill company has just been started.

The latest report of the Director of Commerce and Industries mentioned that the total number of factories in the State had risen from 1 cotton-spinning mill and 44 ginning factories and presses in 1901 to 148 factories of all kinds using steam in 1912.

AMERICAN APPLIANCES DESIRED.

In discussing with Mr. Nanavati, Director of Commerce and Industry, the possibility of extending the use of American appliances and machinery in Baroda's industrial and agricultural development, a memorandum was submitted to me of the following appliances, concerning which the Baroda Department of Commerce and Industry would especially like to secure catalogues and other information from the United States, with a view to their introduction into Baroda.

if found suitable to conditions here. These articles as thus suggested which American manufacturers might supply to Baroda include:

Tools and machine-shop machinery.	Machinery for making hosiery, ribbons, embroidery, tapes, etc.
Cotton-weaving, spinning, ginning, and pressing machinery.	Sawmills, rice mills, etc.
Cottonseed-oil mill machinery.	Windmills.
Machinery for the manufacture of fertilizers.	Pumps and gasoline engines.
Stamping and metal works.	Machines for hand industries and industries that are possible on a small scale.
Cabinetmaking and woodworking machinery.	

Mr. Nanavati especially mentioned the desire of his department to receive American catalogues concerning such articles.

ENCOURAGEMENT OF SMALL INDUSTRIES.

While the Government of Baroda would naturally welcome the establishment of important new industries when they could be adequately financed and managed by experts, it seemed best for the present to give most encouragement to industries on a small scale, and especially to promote the so-called cottage industries which need to be influenced by modern inventions and methods. For instance, the existing hand industries, hand weaving, woolwork, and wood carving, dyeing, and printing, tanning, etc., are in a depressed condition, yet the cost of operation and increased production would certainly follow the purchase of new lathes, improved hand looms, scientific tanning process, small drills, and improved implements. To help financially the artisans in buying such tools it is proposed to organize cooperative societies under Government patronage.

RESULTS OF TECHNICAL EDUCATION.

The most important large factories in Baroda are those connected with the cotton industry, which has been greatly assisted by the superior technical education available in Baroda, especially in the use of aniline dyes and artistic designing of colored patterns, in which Baroda piece goods now holds a high reputation throughout India. The State still consumes large quantities of foreign cotton goods, including Pepperill drills from the United States. With increased prosperity and higher standards of living the local demand for all kinds of cloths, leather goods, etc., has shown large increase.

Among other important manufacturing industries, Baroda has achieved much success in the production of chemicals, medicines, and perfumes, and in leather goods, some of which are exported to Europe. The Baroda School of Arts is the oldest institution of its kind in India, and has had an important technical influence in other States, whose students have received industrial training at this school, especially in the dyeing industry, special instruction being furnished here in vegetable, mineral, and synthetic dyestuffs, coal-tar chemistry, and calico printing. There are workshops also for giving practical training in molding, foundry, forging, lathe work, and use of machine tools and practice in operation of engines and boilers. Engineering work is done here for the Baroda Public Works Department and other customers. There are also departments for teaching civil engineer-

ing, architecture, carpentry and furniture making, enameling, wood carving, photography, preparation of halftone blocks by process work, terra-cotta work, and tile making. There is also a School of Commerce, which teaches bookkeeping, shorthand, and typewriting, banking, etc., and a night school for artisans. All these departments and schools are now grouped within the Baroda Technical Institute, which has about 450 students, who in some instances receive tuition free, but most generally pay fees not exceeding \$8 per year. In visiting this institute, I noticed quite a few American tools being used, such as presses from Chicago, and scroll saws from New York. The institute likes to be supplied with well-illustrated catalogues of the most improved implements, which if found suitable might be purchased for demonstration.

EDUCATIONAL PROGRESS.

The State of Baroda expends about one-twelfth of its annual revenues for education. About \$30,000 is expended every year in erecting new school buildings. There are already nearly 3,000 educational institutions of all kinds within the State, which includes 2,861 regular primary schools. In the latter schools are 127,804 boys and 60,569 girls. Free and compulsory education was started in 1893, immediately after the return of the Maharaja from his European and American travels; all boys between the ages of 7 and 12 and all girls between the ages of 7 and 10 being required to attend school. During the past 10 years the number of males in Baroda who can read and write has increased 8 per cent, and the number of females, 343 per cent. Except the States of Cochin and Travancore, in the extreme south of India, Baroda now has a higher percentage of literacy than any other part of India, the census of 1911 showing 175 males and 21 females out of every 1,000 of the respective sexes who could read and write. English education in Baroda, though not yet widespread, has also made great progress, the number of males knowing English having increased from 18 out of every 10,000 in 1891, to 90 in 1911, while English education among females for the same period increased from 1 to 5 per every 10,000. The number of printing presses in Baroda has risen from 9 in 1900 to 23 in 1910. The last census of Baroda, 1911, mentions that newspaper circulation in the State had more than doubled in 10 years, and that there is now hardly any village, even in the remotest district, where a newspaper of some sort is not to be found.

THE LIBRARY SYSTEM.

One of the most interesting institutions of Baroda is the Central Library Department, organized by Mr. W. A. Borden, of New Haven, Conn. This department not only maintains at the city of Baroda one of the finest libraries in India, but also circulates books throughout the State in traveling libraries which remain at each village three months, after which fresh books are furnished. Each village also gets a grant of money from this department for purchase of books for local libraries up to \$100 per year, provided an equal amount is subscribed by the inhabitants. There are now 275 public libraries with about 156,000 books within the State, and within the last three years the number of readers is said to have increased nearly 360 per cent. The

original nucleus of the present library system was the Palace Library, which the Maharaja threw open to public use. In 1912 about 3,500 books were purchased by the Government for the Central Library. The Government also maintains a central book depot in Baroda City for purchase of textbooks for schools, and for the purchase of such books there is now a standing advance of about \$11,000 per year. The Central Library is about to open a special department for women readers, and it is proposed to personally invite Baroda women who can read to avail themselves of the opportunities offered. A visual instruction department to educate people who can not read, and to promote general intelligence concerning the outside world through stereoscopes and cinematographs is also in successful operation.

AMERICAN CATALOGUES REQUESTED.

The library system of Baroda is chiefly used for industrial and commercial study. As one instance of its educational value, Baroda now has a large number of book writers of its own. In 1910 about 200 books were published by Baroda authors. One interesting feature planned is a department to be specially devoted to catalogues of leading manufacturers throughout the world, which will be open to reference by every person or firm which desires to make purchases of improved equipment for industrial or household purposes. It was suggested that I call special attention to this department and mention that contributions of catalogues from American manufacturers are especially invited. These catalogues will all be indexed by the card system, and it is expected that much use will be made of them. One much used feature of the Baroda library is a large card index of British manufacturers and of their products, the latter being classified separately. This was furnished by the Commercial Intelligence Bureau of London. By special request of the library authorities a directory of leading American manufacturers was recently furnished through the American consulate at Bombay. It is suggested, however, that a card index in a suitable wooden case, as for British manufacturers, would command more attention in the library, and might perhaps be furnished by some leading American commercial or manufacturing association. It is the intention of the Baroda Government as soon as possible to found a large commercial museum, on the lines of the Philadelphia Commercial Museum, and representative commercial collections will then be sought from all over the world.

THE INSPIRATION OF THE RULER.

The Central Library Department of Baroda issues the only periodical in India exclusively devoted to library topics. It is called Library Miscellany and appears quarterly, having been started in 1912. In perusing a recent issue, I notice an interesting address of His Highness the Maharaja, given before the Baroda Library Club. He stated that work in libraries should be divided into two parts, English and vernacular, and that while English is necessary for the higher standards, yet books in vernacular should be provided for those who could not read the English. He mentioned that while India is poor and its wants are many, yet the people must rise superior to their circumstances and realize that more knowledge is their greatest need, their

greatest want. They must be brought to love books, not attractive bindings nor pretty pictures, but the contents of those books. They must be taught to make books a part and parcel of their lives. The first issue of this periodical also has an interesting article on what New York State does for libraries and what the Baroda State does, in which it is shown that though the resources of New York State are much greater than those of Baroda and the population four times larger, yet the library activities of the two States are fairly parallel.

GOVERNMENT AIDS TO AGRICULTURE.

Although manufacturing industries are making important progress in Baroda, agriculture is the main reliance of the inhabitants, and in this branch the Government is also rendering substantial assistance, especially in encouraging the use of modern implements for cultivation. For instance, the Government grants a free advance on half the price of all approved plows which are purchased, or rather it usually buys these plows itself for about \$11 each and sells them for \$5.50 each to the farmers. Light English plows and harrows are mostly used, and their sale is rapidly increasing. It is explained to me that American plows might be suitable, yet they had never been advertised in Baroda and were not known, so that the English "Ransome" plows now command the market. The Government puts up demonstration plants free, and is also arranging for organization of cooperative credit societies to assist in the purchase of pumps, well-boring apparatus, oil engines, etc. A severe water famine in 1912 gave great stimulus to the purchase of well-boring apparatus, the Government itself purchasing 18 sets. The usefulness of such apparatus was so well proved that the demand promises to become much larger even in years of normal rainfall.

The Government maintains a model farm near Baroda, where improved methods of cultivation, chiefly of cotton, are shown, and also the advantages of using improved implements. I observed a few American appliances at work here, chiefly hoes for weeding between rows of cotton. The Baroda Department of Agriculture issues a quarterly journal in the vernacular language. It has a circulation of 2,466. Inquiries are answered as to agricultural appliances. For instance, in 1911 there were 2 inquiries for pruning machines, 15 for well boring, 5 about sugar refining, 52 about plows, 12 about chain pumps, and 2 about plantain-fiber extracting machines.

LIFE AND INTERESTS OF THE PEOPLE.

About nine persons out of every ten in Baroda are supported by simple village or agricultural occupations. The trade of the State is mostly carried on by small merchants who purchase their supplies in Bombay. The Bank of Baroda (Ltd.), which is under the patronage of and largely supported by the State Government, gives valuable assistance to local trade and industry. The principal crops in Baroda are cotton, tobacco, oil seeds, and juwar, bajri, rice, and pulse used as foods. The State is divided into four districts, which are situated widely apart and are separated from each other by large tracts of British territory or of other native States. None of these districts forms a continuous block of territory, each being cut up by

large tracts of intervening foreign territory. The total number of villages in the State is 3,054. Out of 42 towns, 26 have a population of more than 5,000, Baroda City, with 99,000, being the largest. The population of the entire country on March 10, 1911, was 2,032,798, while its area is 8,000 square miles, or the same as Massachusetts.

PUBLIC IMPROVEMENTS.

In proportion to its area Baroda has a greater railway mileage than any other State of India. In addition to the main railway lines owned by private companies which traverse the State the Baroda Government has about 600 miles of railway, which act mainly as feeders to the main lines, so that the whole State may have easy access to them.

In the city of Baroda the horse trams are about to be replaced by trams driven by petrol motors of 25 horsepower and capable of seating 46 passengers, and to run at an average consumption of 8 to 9 miles per gallon of petrol. The new cars are of the same type as those running in Karachi and seem particularly adapted to Indian cities, where electric tramways are not cheap enough to permit the low fares necessary for the native population. The new cars will run on the same track which the horse cars have used.

EFFECT OF WISE ADMINISTRATION.

With the present remarkably advanced condition of the State of Baroda it may be mentioned that until 1875, when the present Maharaja was proclaimed ruler, after his predecessor had been deposed by the British Government on account of oppression of his subjects and general misconduct, culminating in the attempted murder of the British Resident at his capital, Baroda was one of the most backward States of India. While the State has always been rich in natural resources and is now considered the third richest State in India, yet until the reign of the present Maharaja the State revenues had been expended chiefly on the palaces and personal pleasures of the ruler. Interesting relics of these previous extravagances, such as cannon made of solid gold weighing 280 pounds each, a carpet with floral designs in diamonds, rubies, emeralds, and pearls, and jewelry containing some of the largest precious stones in the world, are now shown to visitors; yet the present governmental authorities of Baroda seem to take much more pride in the visible evidences of Baroda's recent remarkable educational and industrial progress. All the leading officials of the Baroda Government are natives of the State, but educated chiefly in England or in the United States. They all seem inspired with much zeal for their duties, and are undoubtedly rendering valuable services.

HYDERABAD.

The State of Hyderabad, located about midway between Madras and Bombay, in the south central part of India, with a population of about 13,500,000 (about equal to that of New York and Massachusetts combined), and with an area of 82,698 square miles (just about the same area as Kansas), is, generally speaking, the most

important Native State in India in population, wealth, and potential resources. Until within a comparatively recent period, however, it has been backward in development and progress, as compared with such decidedly progressive Native States as Mysore, Baroda, and Gwalior. The population of Hyderabad is more than double that of the Native State of Mysore, about four times that of Gwalior, and over six times that of Baroda, while in area it is over double that of any other Native State in India, except Kashmir, in the extreme northwestern part of the Empire, which is slightly larger.

AN AUTONOMOUS STATE—EVIDENCES OF PROGRESS.

The State of Hyderabad may be considered an important “imperium in imperio,” for, although it is within the British Empire of India and subject to a certain amount of protective advice and guidance of the British Government, as represented by the British Resident at the capital city of Hyderabad, it has entire control over its internal affairs. It even has its own customs system of levying duties on goods imported or exported, its own post-office system, for which Hyderabad stamps may be used, and its own mint for coining money used within the State.

There are signs of the State of Hyderabad joining the movement of commercial and industrial progress which within the last few years has so strongly characterized the other leading Native States mentioned. The present ruler, or Nizam, of this State, who is the wealthiest and most powerful native sovereign in India, since his accession to the throne in 1911 has given indications of a marked desire to promote the prosperity of his subjects, and also of business-like qualifications which have already effected important economies in State administration, and secured the services of more competent and trustworthy subordinates to carry out the detailed work of government. On the anniversary of his birthday on June 14, 1913, the British Resident at Hyderabad paid an important tribute to the intelligence and keenness for work of His Highness, who during the short time that he had been ruler had already given proof of his desire for pure and progressive administration and for acting for the good of his people, and this, of course, meant that there was a bright future for Hyderabad. Among instances to illustrate his progressive policies were mentioned his recent reform of the judicial and educational departments of his State and his large personal contributions toward movements for the public good.

AN OFFICIAL REVIEW.

The State of Hyderabad publishes reports as to its administration only once every four years, and unfortunately by the time such reports are off press they are all considerably out of date. A report for the four years ended in 1910 has just been issued, and, notwithstanding that the events summarized are over three years old, they give evidence of the economic strength of the State. Although these years were not exceptionally prosperous, yet the revenue receipts rose from \$16,000,000 to \$17,600,000, about one-half such revenue being contributed by a land tax.

It was shown that 50 per cent of the exports of the State consist of cotton, and farmers have benefited both from the high price of this staple and from increased marketing facilities. The number of spinning and weaving factories remained the same, employing 2,917 hands, but the number of cotton gins rose from 57 to 100.

The excise revenue expanded materially. Greater control is gradually being acquired over the manufacture and sale of liquor, and when these arrangements are completed it is hoped to check the increasing consumption, which is attributed to the cheapness of country spirits in several parts of the State. Formerly the imports always exceeded the exports, but owing to the opening of the cotton tracts by railway and the increasing cultivation of oil seeds, the value of the exports has exceeded imports for the past decade.

The railways of the State, under the control of His Highness the Nizam's Guaranteed State Railway Co., earned 5.44 per cent for the four years under review for the broad-gauge line and 6.64 per cent for the narrow-gauge line. This company not only reimbursed the State the guaranteed interest due but also paid the State about \$480,000 as its share of surplus profits. The value of the government holdings in this company in 1910 was estimated at about \$3,260,000.

During this four-year period about \$1,130,000 was expended by the Government on new buildings and about \$600,000 on new irrigation works, as well as \$900,000 on restoring works which had been damaged by disastrous floods.

The output of gold steadily increased, but the expenses of working rose simultaneously, owing to the difficulty of obtaining fuel and the cost for the carriage of coal from the nearest railway stations. During the four years ended in 1910 the annual customs receipts on imported goods rose from \$2,366,000 to \$2,500,000. Goods for the Nizam or his Government pay no duty.

GOVERNMENT MINT, ELECTRICAL AND ENGINEERING UNDERTAKINGS.

The Hyderabad mint is one of the most interesting features of the capital city. Although this institution was originally started for the sole purpose of coining money, the stamp and postal department has also been combined with it, and the mint master, at present Mr. R. L. Gamlen, an Englishman, has lately been made director of electricity, on account of his being the best authority in the State on mechanical and technical subjects. Mr. Gamlen now has charge of the chief electrical and engineering undertakings of the State. Under his direction two 500-kilowatt electric generators have been installed at Hyderabad for operating the mint and postage-stamp factory, and some enlargements of this installation will probably be made shortly. The power is generated from steam.

American electric incandescent lamps are now being installed overhead in Hyderabad streets, and the palaces of the Nizam are also now being illuminated by electricity. There is also being erected under the management of Mr. Gamlen a big mechanical workshop with a large foundry, at a cost of about \$100,000. This is intended to be used chiefly for turning out engineering work for the State and also for mechanical training in various lines, the development of the State at present being much handicapped by the lack of trained men.

for necessary construction work. It is intended also to start oil, flour, and timber mills on a small scale for demonstration.

The Hyderabad mint proper produced during the 4-year period ended in 1910, 27,526,895 rupees; 2,171,069 half-anna, 114,562,382 2-pie, and 6,876,334 1-pie copper coins. The Hyderabad rupees are at a slight discount as compared with Indian Government rupees. (12 pies equal 1 anna, 16 annas 1 rupee, and in Indian currency 1 rupee equals in United States currency 32.44 cents.) The average income of the mint is about \$351,617, and the average income of the stamp department is \$305,000 per year. Gold coins are minted at Hyderabad only for ceremonial purposes, and are not legal tender. They are presented as gifts to the Nizam at durbars or court functions, and on occasions of official calls to felicitate the sovereign on any happy events in his family.

AN ENGINEERING ACHIEVEMENT.

A great engineering project inaugurated in March, 1913, is not mentioned in the official administration report, which covers events only up to 1910. This is a scheme for damming the River Musi at Gundipet, near Hyderabad, to serve the double object of preventing disastrous inundations of the city by floods and also to supply pure drinking water to the population of the two neighboring cities of Hyderabad and Secunderabad. This scheme originated as the result of the terrible floods of 1908, which in the city of Hyderabad swept over about 343 acres of thickly populated area, cost the lives of some thousands of people, destroyed about 20,000 houses, and altogether rendered nearly 85,000 people homeless. The town of Hyderabad, being about 4 miles from where the Rivers Easi and Musi unite and just below a sharp bend in the river, is particularly subject to floods, caused by simultaneous arrival of flood waves from the two rivers, and also (as happened in 1908) by the onrush of water from irrigation reservoirs which were destroyed.

The present great work is being carried out from plans suggested by Mr. M. Visvesvaraya, one of the leading engineers of India, and now dewan, or prime minister, of the neighboring State of Mysore. The dam built 120 feet high will afford facilities for disposal of flood waters so that they will not come through the city of Hyderabad. The drainage area intercepted will be 250 square miles, and about 6,500,000,000 cubic feet of water will be stored for irrigation and municipal purposes, and there will also be an average area of about 335,000,000 square feet to a depth of 9 feet for moderating the floods. It is proposed eventually to construct two storage reservoirs for storing the excess discharge in a flood, one on each branch of the river, 6½ and 8½ miles, respectively, above the city. The capacity of Easi reservoir for storing flood water will be 8,379,000,000 cubic feet and that of Musi reservoir 5,360,000,000 cubic feet; total 13,739,000,000 cubic feet. This is equivalent to a run-off of nearly 6.9 inches from 862 square miles, the entire catchment above Hyderabad. This work is in charge of the Public Works Department of the Nizam's government, of which Mr. Ahmed Ali, F. C. H., is secretary, and under the immediate direction of an experienced European engineer, A. T. Mackenzie. The Hyderabad Bulletin of March 24, 1913, which con-

tained an account of the foundation-stone laying by His Highness the Nizam, stated:

A feature of the preliminary work already executed is a masonry reservoir built on the east of the site, which provides pure filtered drinking water to the small army of workpeople who have been already located in well-built dwellings near by. The sanitary precaution thus wisely undertaken will, it is hoped, effectually frustrate the occurrence of epidemics which would be fatal to the progress of the work, particularly as labor has been most difficult to obtain. Besides the light railway which is in constant use for conveying tons of stores to and from the works, electric power will within a fortnight be available, supplied by the electrical department, under Mr. R. L. Gamlen, and an immense saving in labor will be gained by the use of electrically driven stone-crushing and mortar-mixing machines, cranes, winches, and other modern apparatus.

No approximate figures have been furnished as to the probable cost of this undertaking, but the various works connected with constructing a dam 120 feet across a river draining nearly 1,000 square miles of the country and subject to violent floods, also constructing conduits 12 miles long and a pipe system for both drinking and irrigation, will require expenditures of large amounts. The scheme under way will only half protect Hyderabad from floods, as the River Easi will have to be controlled by larger works, but these can be applied to irrigation.

IMPORTS AND EXPORTS—AGRICULTURAL MACHINERY.

The chief imports into the State of Hyderabad include cotton piece goods, yarns, copper and brass utensils, and iron goods, comprising a variety of articles of hardware, as well as iron bars, corrugated iron roofing, bridge material, etc. In 1910, the latest import figures available, cotton piece goods to the value of \$4,938,000 were imported into the State, yarns to the value of \$1,709,000, copper and brass utensils to the value of \$378,666, and iron to the value of \$414,666. The chief article of export is cotton. The recently appointed Director of Agriculture, Mr. John Kenny, is endeavoring to introduce into the State a variety of cotton required for better classes of cotton cloths, and is also trying to educate the native farmers to see the disadvantage to themselves of adulterating their best grades of cotton with inferior grades, and also the business folly of watering their cotton, as they frequently do, to increase weight.

Although agriculture is the chief industry of Hyderabad State, agricultural implements of modern type are little used. Mr. Kenny, the Director of Agriculture, believes, however, that a good market should develop for small portable hand pumps that can be carried about by two coolies, and which can pump water direct from rivers or gravitation channels from tanks. He says that such pumps would have to be simple so that anybody could work them, as mechanical knowledge is lacking among farmers, and the slightest trouble with the pump might necessitate sending it 100 miles or so for repairs. The only kind of plows which can meet with important sale would be the cheap, light, and shallow sort easily drawn by bullocks. He mentioned that an American plow introduced into Hyderabad at one time failed because the driver was unable to make his bullocks go by the usual method of twisting the tail.

Mr. Kenny also suggested that in connection with the sugar-date palms, scattered in immense numbers over the State, the introduction of American machinery for making sugar from the sap as

used in connection with the maple-sugar industry of Vermont might be of great economic advantage to the country. It was mentioned that the growth of cooperative credit societies in the State was beginning to give valuable assistance to farmers in purchasing needed implements and tools, and that a State bank would probably soon be started in Hyderabad, which would loan large State funds, now idle, to the agricultural classes at low rates of interest.

Irrigation is necessary over the most important sections of Hyderabad. Many dams have been thrown across the valleys and streams and gorges between hills and made land available for irrigation by sluices. There are also about 125,000 wells in the State. The land served by wells is irrigated by the primitive method of lifting the water by large buckets drawn by bullocks.

LARGE EXPENDITURES OF THE RULER.

The Hyderabad Government itself and the Nizam personally import foreign goods rather extensively in connection with public works, palace supplies, etc. The Nizam is reputed to be the wealthiest individual in India, and one of the wealthiest persons in the world, with a personal income said to amount to \$2,500,000 per year. About 400 motor cars, mostly of a rather expensive type, are owned by his highness, and used by himself, the ladies of his large zenana, or harem, his government officials, and for various services and functions connected with his palaces. The expenditure on palace improvements every year is large. For instance, in connection with the renovation of one palace near Hyderabad to be used especially for residence of distinguished guests, a noiseless rubber flooring has been laid down at a cost of about \$25,000. All sorts of expensive art works, cut glass and porcelain, electric lamps and clocks, and other novelties are much in evidence about his palaces. Some paintings and works of sculpture of great European masters are to be found there. The banquet hall of the main palace at Hyderabad has a dinner service of solid gold. The Nizam's palaces are said to be fully if not more than the equal of the royal palaces of the leading countries of Europe in magnificence.

BUSINESS METHODS INTRODUCED.

The present Nizam has done a great deal to increase the financial credit of his government. Previously State expenditures, and especially personal royal expenditures, had been on a carelessly extravagant scale, and firms which sold goods at Hyderabad were constantly complaining of dilatoriness in having their accounts settled. The new Nizam, however, is not only much more economical in making purchases, but also sets an example to his subjects of prompt payment of State and personal debts. Shortly after his accession the State of Hyderabad established a banking account with the Bank of England at London, and now foreign purchases are promptly paid for by checks on this bank. He has also interfered in behalf of tradespeople in India who had long-standing accounts against various princes and members of the Hyderabad nobility. These individuals thus owing money long overdue are obliged to settle with their creditors or have their estates sold in payment of such debts, and I

heard of one instance during my stay there of a leading nobleman being under guard to prevent unwarranted extravagances exceeding his known income. For State economy he has recently reduced his standing army to 12,000 officers and men; about 4,000 men, 680 horses, 7 elephants, and 4 camels being retired from the State military service at an annual saving of about \$309,351.

THE CITIES—PROPOSED TRAMWAY.

The State of Hyderabad contains 79 towns and 20,010 villages, and of the total population 1,132,109, or 10 per cent, are in urban areas. The chief city is Hyderabad, with a population of 448,466. The State contains four cities with 20,000 to 50,000 population, 16 towns of 10,000 to 20,000, and 58 towns of 5,000 to 10,000. Of villages with a population of 2,000 to 5,000 there are 514; in 1,862 villages the population ranges from 1,000 to 2,000; 4,344 villages have a population between 500 and 1,000, and 13,000 villages have less than 500 inhabitants. The average population of a village is 500.

There is a large British military cantonment at Secunderabad, about 5 miles from Hyderabad, and here are also located the leading European shops and hotels. The road between Hyderabad and Secunderabad is lined with many handsome residences, and at one side there is a large artificial lake on which there are many pleasure boats. A tramway system between the two cities, to be operated by electricity, is under contemplation. Most of the goods imported into the State of Hyderabad come from large firms at Bombay.

FORESTS, FAUNA, CLIMATE, AND RELIGION.

In the hilly tracts of Hyderabad there are many forests, but as a rule the timber is rather stunted and deformed. Much of the land is level and a large portion under cultivation, though there are large areas of wild jungle. A greater variety of wild animals and feathered game is not to be met with in any part of India, excepting perhaps Mysore State. Tigers and leopards are found everywhere, while bison and occasionally elephants are met with. Wild hogs are found in the jungles and innumerable herds of antelopes in the plains. Hyenas, wolves, tiger-cats, jackals, bears, heron, etc., are found in great abundance.

The climate is not altogether salubrious, but in general may be considered good, for it is pleasant and agreeable during the greater part of the year. As the country is partially hilly and free from such arid bare deserts as in Rajputana and other parts of India, the hot winds are not so keenly felt. There are three marked seasons—the rainy season, from the beginning of June to end of September; the cold season, from the beginning of October to end of January; and the hot season, from early in February to end of May.

Mohammedanism is the religion of the greatest number of the people, and also the religion of the court.

GWALIOR.

In October, 1913, I paid a short visit to Gwalior as the guest of His Highness the Maharaja of that Native State, who is one of the most powerful, wealthy, and progressive of the native rulers of India. In

fact, His Highness is deservedly noted throughout India as a sovereign of unusual capabilities, whose greatest personal pleasure and hobby is hard work from early morning until late at night, every day, in the interests of the industrial and commercial prosperity and welfare of his subjects.

AREA AND POPULATION—RAILWAYS.

The State of Gwalior, in central India, has a total area of 25,041 square miles—i. e., about equal in extent to West Virginia—and a population of nearly 3,000,000, or approximately 120 to the square mile. The State is separated into two detached portions by some British territory and a few small Native States. The southern section, comprising about 10 per cent of the whole, is known as the Malwa district and has been noted in the past for its large production of the Malwa opium of commerce; but of late, on account of the restrictions imposed upon the opium trade with China, cotton has been superseding opium as the most important crop. In the northern section there is a large production of wheat and other grains and fodder crops, also cotton and sugar cane.

The State capital is Gwalior City, with a population of about 120,000. There are 9,538 villages, with an average of 273 inhabitants. The State is traversed by the Great Indian Peninsular Railway between Bombay and Delhi. The city of Gwalior is about three hours' journey by train from Agra and about six hours' from Delhi, the new capital of India. The State owns a 250-mile light railway of 2-foot gauge, which makes gross earnings of over \$100,000 per year and is a helpful factor in the economic development of the State. It is said that it originally owed its start on a small scale to the Maharaja's fondness for mechanics, His Highness having operated the first cars for personal amusement before realizing that the enterprise might be turned to important public use.

THE OFFICIAL RESIDENCE—MAHARAJA AN ABSOLUTE RULER.

The city of Gwalior contains many fine public parks and buildings and in some respects reminds one of the city of Washington, especially in the beautiful and imposing white palace of the Maharaja, which rather resembles the White House at Washington, except that the palace is larger and more ornate than the official residence of the President of the United States, although the shape and position of the wings are about the same. The furnishings are magnificent. At official banquets an ingenious American electrical device of silver is used for passing around the after-dinner coffee, cordials, and cigars. This is a miniature locomotive and train of cars, which, operating from an electric battery and running over a diminutive track laid along the table, is so constructed that it automatically stops before each guest.

In the case of the Maharaja, the famous saying attributed to Louis XIV of France, "L'état, c'est moi" (I am the State), might apply, except that the Maharaja of Gwalior, although possessed of practically absolute power, limited only by certain treaty stipulations with the British Government, uses his power not for personal ends but for the good of his subjects. His Highness rules without a prime minister or dewan and has active personal supervision over every

detail of his Government. On official occasions or holidays he is attended with much pomp and ceremony, but in his ordinary private and official capacity he is most democratic and unassuming, is invariably extremely courteous, and always readily approachable on matters connected with Government business.

DIRECT TRADE REPRESENTATION NECESSARY.

His Highness spends much of his spare time in keeping in touch with the outside world, and is a subscriber to two American periodicals, one commercial and one scientific. In the interview which he accorded me, I was impressed with his general knowledge of the world's progress, especially in trade and industry; he seemed not unlike some of the American "captains of industry" and "financial magnates."

In this interview, His Highness, knowing that the purpose of my travels in India was to report on the opportunities for extending American trade, at once forcibly expressed his opinion that the chief obstacle to selling American wares in India is that American manufacturers are not, in enough instances, directly represented by persons who will actively push their goods. He mentioned that it was too difficult for the average consumer in India to find out about various American specialties which might be utilized to advantage; and that if one did learn of such specialty and then desired to obtain it there was too much difficulty and delay in effecting a purchase.

For instance, His Highness mentioned that noticing an advertisement of an American folding pocket camera he wrote to the American manufacturer, giving an order. In reply he was told that he must send cash in advance before the camera could be shipped. He then directed his agent in London to purchase the same for him, and after many months the camera was received. His Highness is now taking pictures with it, with very satisfactory results. He had the same experience in ordering an American "merry-go-round" for the entertainment of children visiting his palace.

PURCHASING AGENT—INSPECTION OF GOODS.

His Highness explained that in making foreign purchases he had found it advantageous to do all such business through an agent in London, to whom he allows 5 per cent commission. This agent, who also acts as agent for many manufacturers in England, gets important trade discounts, sometimes 15 or 20 per cent, or even more; but these discounts are all credited to the Maharaja. The present foreign purchasing agent is the London firm of Kerr Stuart & Co. (I understand that the same method of purchasing foreign goods is pursued by several other leading rulers of India.)

In His Highness's opinion, American manufacturers, either individually or in noncompetitive groups of different lines of goods, should establish agencies in Bombay, Calcutta, and Madras, and keep their goods in stock, so that they can easily be inspected and purchased, and there should also be a well-qualified corps of commercial travelers to reach individual consumers throughout India. The Maharaja stated also that most consumers of goods in India wish to see samples or witness demonstrations before purchasing, and that very clear

Illustration or demonstration is necessary in most instances, as it can not be taken for granted that the native population is familiar with many articles well known in other countries. He expressly suggested that with mechanical appliances, such as those much needed in his own State for agriculture and deepening wells, it would be desirable for commercial travelers, who could not conveniently transport such bulky articles about the country, to carry at least miniature working models or specimens for demonstration. He thought that if American manufacturers would pursue this policy highly successful results would follow. His Highness suggested also that any appliances for the Gwalior market should be as cheap and simple as possible, in order to be within the financial means and understanding of the people.

DROUGHT RELIEF WORK.

At the time of my visit there was a serious drought in Gwalior with prospects of a famine during the next year unless rain came in time to start winter crops growing. His Highness was giving earnest attention to means for avoiding calamity and much suffering of his people. It had already been arranged that fodder for cattle and grain for human consumption should be admitted into the State practically free of railroad charges and customs duties. There was a probability, also, that road building, and other public works, would be started in order to give employment to destitute people. Moreover, much attention was being given to deepening wells to get more water, and also to building silos, where fodder could be stored for times of drought and fodder deficiency. His Highness's Minister of Commerce and Industry (G. J. M. Hamilton, Esq.) advocated State aid to farmers and landowners who installed oil engines for irrigation, and formation of a semigovernmental company to cut and store fodder and maintain a fixed supply to relieve distress in years of crop failure.

STEAM PLOWS AND OTHER AGRICULTURAL MACHINERY.

There are large sparsely populated areas in Gwalior where scarcity of labor exists. Much of this land might be advantageously cultivated by machinery. The Maharaja in his public review of the departmental reports of his Government for 1911-12 said:

Though it is pleasing to note that a slight improvement has taken place in the population, it is still very low for purposes of the necessary extension of cultivation. For this one reason alone I am of opinion that cultivation by machinery will be found both useful and economical. It is gratifying to note that the revenue minister thinks that the success so far achieved in cultivation by machinery is satisfactory, and I strongly hope that he will see his way clear to expand the scheme all over the State.

The revenue minister, in the report above referred to, stated:

The scheme of starting a regular steam farm at State expense and working it departmentally was given a trial during the year under report, but it was delayed by preliminary arrangements. The engines which were intended to be used in rabi (small grain) cultivation, as well as the combined implement, did not suit local conditions of soil to the desired extent, and therefore very little of the land could be brought under rabi sowings. At the end of the year I adopted quite a novel system of working the steam plows, in which the land was first cleared of the jungle standing on it and plowed through at State expense. The land thus thoroughly plowed and prepared was offered for sowing and was readily taken up on lease in preference to unbroken lands by a

number of people of the district as well as by new settlers from the Punjab, who, moreover, offered to pay the full rental for such lands from the very first year of their occupation of them. The advantages which this plan has over managing the whole enterprise departmentally or over working the steam plows on the hire system are plainly manifest. The full revenue of these lands, which will now be coming in under the terms of the lease and which the people would not have had to pay had they preferred to take up unplowed waste lands, will, it goes without saying, more than compensate for the expenses incurred by the State in originally clearing and plowing them, not to speak of the facility it affords for their ready and permanent occupation by the people.

IRRIGATION PROJECTS—INFORMATION DESIRED.

As regards irrigation works, the same report stated:

One hundred and seven works costing \$156,828 were completed during the year, bringing the total number of completed works up to 453. Three hundred and ninety-three works, the aggregate estimated cost of which is \$1,446,364, were under consideration. Six projects aggregating \$1,446,364 had been submitted for orders, while 74 were under review in the office of the Member, Board of Revenue for Irrigation. Twenty-seven projects, the aggregate cost of which is \$168,222, were refused sanction for various reasons. Estimates aggregating \$533,465 were sanctioned during the year, and of these seven important works were estimated to cost \$193,909.

The above remarks should be noted by American manufacturers of steam plows, grass-cutting machines, and other mechanical appliances of agriculture and of such irrigating machinery as pumps and oil engines. American catalogues or other information concerning such articles may be sent to the Revenue Minister, Gwalior, Central India. The Minister of Commerce and Industry also mentioned that such catalogues and information would be found useful in his department as well, although the general interests of agriculture are looked after by the Revenue Minister. The Maharaja himself would also no doubt take an interest in any such literature that might be sent to him, as he gives close attention to everything of a mechanical nature which comes before him. There was some discussion in Gwalior as to securing an American expert to teach up-to-date methods of agriculture by machinery in Gwalior.

STATE FACTORIES.

It has been the policy of the Maharaja to establish as many new industries as would prove suitable to local conditions. In State industries already started the best machinery and equipment has been purchased, regardless of expense. The various State factories at Gwalior are interesting places to visit. Among them may be mentioned: The leather factory, which manufactures saddlery and harness of all kinds, horse clothing, portmanteaus, trunks, hand bags and cases, and boots and shoes, military boots, etc., and belting for machinery; metal works, which manufacture padlocks, letter locks, box and drawer locks, steel trunks and kit boxes, crests, badges, and seals; electric printing plant, which prints Government reports and an official daily newspaper, and also undertakes printing of any kind, including type, block, lithograph, color, and chalk printing, also bookbinding and manufacture of stationery; the paper mill, which manufactures various sorts of paper, including foolscap, white printing, white cartridge, and white manila; the stone quarries, which cut the well-known Gwalior sandstone for building purposes, and where a unique industry

in stone carving for façades, balconies, arches, panels, doors, etc., is carried on; the carpet factory, where are manufactured fast-vegetable-dye woolen carpets of many beautiful designs and of excellent finish, which are largely exported to Europe and America; the Gwalior workshops, consisting of various branches which undertake furniture making, carriage building, motor-car repairing, making transport and bullock carts, locomotive parts, railway carriages and trucks, iron and metal work of all kinds, including wrought-iron fencing, gates, etc., silver and copper work of all kinds, electroplating, die-sinking and engraving, also repair of scientific instruments, watches, clocks, typewriters, etc.

NEW POTTERY FACTORY.

A new pottery factory is being built in Gwalior. A furnace and other machinery have been imported from Europe. Porcelain articles will be made and also tiles for building purposes. Tiles are used largely here for roofing. His Highness the Maharaja Scindia is taking a keen interest in the enterprise.

OTHER INDUSTRIES.

There are about 80 cotton ginning and pressing factories in the State and about 130 factories altogether. There are 14 flour mills in the State and 1 oil mill. Among other industries may be mentioned comb making, which is carried on as home industry, hand-loom and pit-loom weaving, and the manufacture of coarse blankets. There is also an important manufacture of muslins at Chanderi. These Chanderi muslins are renowned for their exquisite fineness of texture and excellence of manufacture, as well as for the blending of gold or silver threads in their weaving. They are to be had in both silk and cotton and either with or without gold or silver thread and in a variety of delicate shades.

The State contains some important potential resources in various economic plants which grow abundantly. The last report of the Department of Commerce and Industry mentions that industries for preparing lac, rusa oil, and aloe fiber wait development by private enterprise or by the State Forest Department, and also that the following possible industries are under investigation: Utilization of faggot wood, utilization of the chief products in charcoal burning, katha works, tannin extracts, resin works, tendu and saintha leaf for biris (cigarettes), rubber (*Cryptostegia grandiflora*) and Baib matting.

The minister of this department is specially anxious to develop as soon as possible an aloe-fiber industry in the State. (This fiber is much the same as the henequen of Yucatan and the Bahama Islands and would be suitable for making rope and twine.) He would doubtless be glad to obtain information as to American machinery for decorticating and cutting the leaves.

CUSTOMS DUTIES—ROADS.

The State of Gwalior is empowered to levy import and export duties. It also has its own post-office system, the Gwalior State stamps being the regular India stamps, with the addition of the word "Gwalior." By arrangement with the India Government such

stamps are good for all parts of India and the outside world. The State also mints a few copper coins of its own, but most of the currency is that of India. Both imports and exports are increasing. Among the most important imports are cotton piece goods, haberdashery, drugs, fibers, metals, and grains. Customs duties on imports and exports of textile raw materials have been suspended for five years.

The roads of Gwalior are very good, yet few persons own motor cars with the exception of the Mahajara, the nobility, and Government officials. His Highness owns 24 motor cars of expensive European makes, which he likes to drive and also repair himself. There are also about 60 motor cars for Government officials, among which I understand there is only one American car. The Maharaja also owns numerous horses and carriages and elephants for State ceremonies.

EDUCATION.

The Government maintains a technical institute for training in mechanical lines. The educational policy of the State is quite progressive for India. Societies have been established for the sole purpose of urging the education of native females. One such organization has as its members all the high officials of the State, another is composed entirely of women. As a special inducement to encourage feminine education, these associations offer rewards to maid servants who take a fixed number of female pupils to school every day, while the schoolmasters are being urged to educate their own wives and then establish a girls' school, on the promise of a handsome subsidy from the Government. The Maharaja has ordered that grants in aid shall be given for the marriage of educated girls, in order to overcome the objections of parents and guardians who hesitate to send their daughters or wards to school.

REVIEW OF ADMINISTRATION.

His Highness the Maharaja prepares each year a review of the administration of Gwalior, which in its general substance is not unlike the annual messages of the President of the United States to Congress on the state of the Union. There is this interesting difference, however. Instead of acting as the official spokesman for different departments of the Government the Maharaja takes occasion, as he considers circumstances may warrant, to criticise the work of any bureau or department which does not conform to his ideals of efficiency. He may mention, for instance, that while he regrets to say anything which might discourage hard-working and loyal officials, yet he trusts that during the next year greater efficiency and more satisfactory results may be obtained. In other cases he may express his hearty congratulation and praise for work accomplished. The same method of reviewing and criticizing departmental reports is practiced in Baroda, except that in Baroda the official critic is the Prime Minister instead of the Maharaja.

Some of the expressions of the Maharaja in his review of the administration of the Gwalior State for 1911-12, indicate his statesmanship and his devotion to progressive ideals which might prove an inspiration to the officials of any well-governed domain. For in-

stance, he says that his officials must eliminate all causes which lead to discontent, ill-feeling, distrust, and disaffection, and that such causes in the main result when justice is not done, or cases not dealt with in a reasonable way, or law is considered a dead letter, or policies are inconsistent, or when it is felt by the public that their rights are ignored and their representations not looked into carefully, or when officers deal with matters with prejudiced minds, or when they are not honest in their utterances.

EUROPEAN EMPLOYEES—ARMY—STATE BANK.

There are over 30 Europeans holding important positions in the Gwalior administration. To these the Maharaja recently made a gift of a handsome clubhouse.

The State maintains three regiments of Imperial Service cavalry, two battalions of infantry, a transport corps, two batteries of horse artillery, and one elephant battery. The army is under the State commander in chief, with a staff. At the time of the Boxer troubles in China and the siege of Peking, the Maharaja fitted out at his own expense a hospital ship for Indian troops engaged in that campaign.

One of the most important projects of the future in Gwalior is a State bank, with a capital of about \$3,000,000, which will assist in the agricultural and industrial development of the State.

KASHMIR.

The Himalaya Mountain territories officially known as Jammu and Kashmir State, but more commonly called Kashmir, occupy 84,432 square miles in the extreme northwestern part of India, beginning in the south where the great plain of the Punjab ends and extending northward to the boundary lines of Russian and of Chinese Turkestan and bounded on the east by Tibet. Kashmir corresponds in area closely to the State of Utah and is the largest Native State within the Empire of India. In its internal administration it enjoys full sovereign powers, though under the suzerainty of the British Government in its foreign affairs. The total population of Kashmir, according to the census taken in March, 1911, was 3,158,126.

VALE OF KASHMIR.

The most populous and important part of the Kashmir State is the southwestern portion, especially that known as the "Vale of Kashmir," noted as being one of the most beautiful districts of the world and as a delightful summer resort for visitors from India and elsewhere. The Vale of Kashmir is an oval basin 80 miles long and 20 broad, extending from southeast to northwest. The Jhelum River flows through this valley, and has several enlargements, making important lakes. On either side of the Jhelum is an extended area of flat alluvial plain which is closely cultivated. The mountain ranges surrounding the valley are among the highest in the world. Mount Godwin Austen, a peak in one of these ranges with an altitude of 28,265 feet, is said to be the second highest peak in the world. The floor of the Vale of Kashmir is 5,000 to 6,000 feet above sea level. On the Jhelum River within the vale are located Srinagar, the

capital and largest city of Kashmir, with a population of 126,344 in 1911; Baramula, with a population of about 7,000; and on the mountain wall of the vale, Gulmarg, about 7,500 feet above sea level, a favorite summer resort of Europeans. Two other important towns in the southern part of Kashmir, but not in the vale itself, are Jammu, with a population of 31,726, and Islamabad, with a population of 9,000.

LADAKH DISTRICT AND ITS RESOURCES.

About two-thirds of the Kashmir State is a mountainous plateau embracing all of the western part and bordering on Chinese Turkestan and Tibet and known as the district of Ladakh, which is physically and racially a part of Tibet. It is watered by the Indus River, but a great deal of it is desert, and there is little cultivation except in districts irrigated from the Indus. Ladakh, although large in area, has only about four inhabitants to the square mile, whereas the valley of the Jhelum River, the part of Kashmir best known to the world, has 154 inhabitants to the square mile. The chief town of Ladakh is Leh, located on a small tract irrigated by the Indus River, in a desert 11,400 feet above sea level. Leh carries on an important trade with Chinese Turkestan and with Tibet, importing chiefly Lhassa brick tea and wool and exporting rice, sugar, and cotton goods. The administration of Ladakh is carried on by a governor appointed by the Maharaja of Kashmir. There is also a British political officer here. In religion, race, and language, Leh is really a Tibetan city. Ladakh has some undeveloped resources in gold, iron, copper, and coal. A small amount of turquoise is exported.

FORESTS—KUTH ROOT—FRUIT—RICE.

There are great forests in Kashmir of pine, spruce, cedar, silver fir, yew, elm, and walnut, which furnish an important item for export whenever they are near rivers to float the logs down to the plains of the Punjab. This industry, however, is carried on in a primitive way, and there is only one modern sawmill in the State, erected in connection with engineering works. Many valuable medicinal plants grow wild, including kuth root, a specialty of the country, growing at elevations of 8,000 to 9,000 feet. It has a scent like orris, with a slight blend of violet. The roots are collected by hired labor through a contractor who settles the amount of royalty with the State. Until lately the management of this branch of revenue has been neglected. The article is exported chiefly to China, where it has a semisacred utility, being used as an incense in Buddhist temples and monasteries. It is also a disinfectant and is locally used as an insect powder. In the Indian pharmacopœia it holds great importance as a medicine. Its use in India is confined thereto. The middleman in Kashmir had been profiting at the cost of the State revenue, but the Revenue Minister has changed the arrangement and a trial has been given to direct management of the business by the State. A semi-commercial department has been organized and there seems a prosperous future for this industry.

All the grain, fruit, and vegetables of the Temperate Zone grow abundantly in Kashmir, which, on account of its elevation and

northern position, is the coolest State of India. It is particularly rich in fruit trees, many being indigenous. The people are quite clever at grafting. Currants, raspberries, and gooseberries are found wild and apricots are common. The fruit has been greatly improved by cultivation and the introduction of choice varieties. There seems no doubt that if cheap transport facilities were available the State might easily supply all of India with fruits of the Temperate Zone. The cultivation of grapes for wine of the Barsac and Medoc types has been tried in Kashmir under French supervision, but has not been profitable.

The staple crop of Kashmir up to 7,000 feet elevation is rice, of which there are about 60 varieties, generally white or red, the former being superior. Successful cultivation requires construction of terraces and irrigation channels. Water is often taken off at great heights, and much labor is expended in bringing it to the rice fields.

IRRIGATION, PLOWING, AND HARVESTS—GRAZING—APICULTURE.

Near the larger towns and villages, lift irrigation is carried on largely, a long pole acting as a lever and working on a pivot upon a crosspiece resting on two uprights or on the forked branches of a tree. The short end of the pole carries a large stone as a counterpoise, and at the long end, like the line from a fishing pole, hangs a thick rope with an earthenware bucket attached. This is rapidly lowered into the river or well by pulling on the rope and dragging down the end of the pole. When this is released, the weight of the stone raises the bucket, which as it reaches the level of the ground is emptied into a long boat-shaped tray of wood, which acts like a funnel and conducts the water in the required direction.

Plowing in the State is done with small plows, for in most places deep furrows are unnecessary. The plows are pulled by small bullocks. Modern metal plows are almost unknown. The harvest time depends largely on the altitude, but the most important harvests are in September and October.

The pastoral interests of Kashmir, especially in sheep and goats, are important. The animals are sent to higher elevations in the summer in charge of shepherds, who on bringing them back intact in the autumn receive 2 per cent of the flocks, together with rice and all the butter produced. There is an aversion to killing these animals, and they are exported chiefly on the hoof.

Apiculture is also an important industry. Bees are kept in earthenware cylinders, about 2 feet long. The outside end of the hive has a central hole about an inch across, or sometimes a series of small holes in a circle. The inner end has an earthenware lid fitted over it and sealed with clay. In winter the bees are supplied with food. Honey bees are found wild in Kashmir at elevations as high as 11,000 feet. During winter, when there is not much agricultural work, the country people spend most of their time attending to the sheep and cattle and in hand spinning and weaving woolen cloths and blankets.

TRANSPORTATION FACILITIES—PRICE FLUCTUATIONS.

To get into the famous vale and reach Srinagar, travelers must go over a mountain road from Rawalpindi, in the Punjab (on the line of the Northwestern Railway), about 197 miles, either by a horse

vehicle, known as a tonga, or by a motor car. The mails are now run between Srinagar and Rawalpindi in tongas, which without stopping at night make the distance in 36 or 38 hours, but for ordinary travelers the journey by tongas takes at least three or four days. In a motor car, however, the journey can be made comfortably in a day and a half, barring accidents. The tongas are uncomfortable to ride in; moreover, they carry practically no personal luggage, and those who travel this way have to send their luggage on in slow carts some days in advance. The fare for a seat in a tonga between Rawalpindi and Srinagar is about \$13, but for a person such as a commercial traveler, who would consider his time of value and who would also desire to take samples and other luggage with him, it would probably be better to hire a motor car, the cost of which for a trip into the vale and back, with a stop-off of a week or so at Srinagar or elsewhere, would be about \$130. Transport of goods between Rawalpindi and Srinagar takes about 15 days in bullock carts.

On account of its mountainous location and lack of cheap transport facilities, Kashmir is in a position of comparative seclusion and is unable at present to develop outside trade as well as internal industries to the extent that its important agricultural, pastoral, forest, and water-power resources would otherwise warrant. This isolation prevents the natural regulation of prices through unimpeded foreign trade and leads to great fluctuations in the prices of food products between seasons of scarcity and seasons of plenty.

A famine in 1878 caused a large number of deaths, while enormous waste has occurred after plenteous harvests. In some parts of Kashmir, notably in the famous vale, the population is rather dense in proportion to the land available for cultivation, and the cost of labor in such districts is exceptionally low. In fact, most visitors to Kashmir during any year of good harvests have occasion to marvel at the cheapness of almost everything in the country.

SRINAGAR, THE "VENICE OF INDIA."

Srinagar, the capital and chief center of industry and trade, is situated on the floor of the famous vale, at an elevation of 5,250 feet above sea level and on a fairly large body of water known as the Dal Lake, fed by springs, and entering the Jhelum River by flood gates. There are also other large lakes in the vale, one of which (Woolar Lake) is being drained to make room for agriculture. There are numerous irrigating canals extending from the Jhelum River at Srinagar, which, in connection with the river itself and the Dal Lake, give the city an appearance somewhat like Venice. The traffic of the city is largely carried on by these waterways, and about 15,000 of the inhabitants live in house boats (flat-bottomed). Travelers visiting the vale usually engage house boats and use them both for temporary residence and for making trips about the neighboring lakes and down the river to Baramula, at the lower exit of the vale, about 35 miles distant. These house boats are propelled by oarmen, whose wages amount to only about 20 cents each for the 35 miles between Srinagar and Baramula. Usually a house boat on the river has a crew of four, and the rent of the boat itself per month is only \$6 to \$7. Ordinarily tourists stopping here engage also a kitchen

boat with a crew of about three, which can be rented for about \$5 per month.

No motor boats were seen, and on account of the great importance of the water at this "Venice of India" the possibility of introducing American motor boats was investigated, with disappointing results. It appears that petrol or gasoline necessary for propelling motor boats at Srinagar costs 74 cents per gallon, owing to the excessive expense of its transport by wagons over the mountains; while, on the other hand, the cost of five men to row a house boat would be less for one day than the cost of 1 gallon of petrol. The only advantage of motor boats in the river, lakes, and canals would be for speed; but for this purpose motor cars would be found more advantageous, as roads on the valley floor are level and good. Some of the house boats at Srinagar, especially those belonging to the Maharaja, are handsome and luxurious. A few American motor cars of cheap types are used, chiefly by Government officials or for tourist traffic. Motor cars would be above the means of most of the native population.

Most of the leading shops and official buildings of Srinagar, the most imposing of which is the royal palace, front the river. The ordinary houses are humble but picturesque, and their roofs are covered with sod on which grass and flowers grow.

INDUSTRIES—SILK MANUFACTURE—WATER POWER.

The city is the center of the famous artistic industries of Kashmir, especially shawl weaving, embroidery, metal work, and wood carving. The most flourishing industry until this year has been the manufacture and export to Europe of silk goods from locally reeled silk, but the large State silk factory, which had cost nearly \$600,000 to erect and which gave employment to about 4,000 people, was destroyed by fire. As this industry had proved profitable, it is probable that the Government of Kashmir will soon rebuild the factory. In 1911 there were 41,000 cocoon rearers in the State, and 265,000 pounds of silk and waste were reeled. Sericulture has been carried on by annually importing seeds from Europe and distributing them among the villagers, who reared silkworms and sold the cocoons to the State at a fixed rate. Except districts in which silk is being produced under the management of the Salvation Army, Kashmir is the only part of India that in recent years has been making a success of the silk industry, although India was anciently famous for its silk products.

A water-power plant near Srinagar is capable of generating 7,000 horsepower, but only a small proportion is utilized, especially since the destruction of the silk factory.

WOOLEN CLOTH—KASHMIR SHAWLS.

There is considerable business at Kashmir in homespun woolen fabrics, such as blankets and outing costumes. A good suit of woolen clothes entirely of domestic manufacture and tailoring can be made to order at Srinagar for about \$6 and a hat to match for 33 cents. Such clothes are usually striped and checked in imitation of Scotch tweeds. It is rare that two pieces of this cloth will be found exactly alike. The colors are not fast and will fade in the sun. It is thought

that the lower duty on woolen imports under the new American tariff may present opportunities for the export of Kashmir woolen cloth to the United States. It is said that such cloth would show a fair local profit if it could be landed in New York to yield 50 cents a yard net. There is also a large manufacture of carpets at Srinagar.

Kashmir has been famous for its shawls from the remotest antiquity, and until about 40 years ago the shawl trade gave employment to over 60,000 people whose products brought into the country over \$1,000,000 per year. During the last few years, however, this industry has seriously declined, owing to change of fashions. France was formerly the best market for Kashmir shawls, and the setback to the Kashmir shawl industry may be dated from the calamities that visited France during the Franco-Prussian War. Many of the best shawl weavers have left Kashmir and settled elsewhere, while others have taken to carpet making or embroidery. The shawls now made in Kashmir are inferior in quality.

The wool of which Kashmir shawls are made, known locally as "pashm," is really a fine kind of hair obtained from the down or under fleece of a handsome species of goat that thrives on the hills and in the valleys of Kashmir and Tibet. The shawl designs are various, but French patterns and new colors, such as magenta, are beginning to prevail over genuine Indian designs and colors, and the goods are rather cheap and showy instead of being real works of art as heretofore. The process of shawl manufacture is briefly as follows: The pashm is cleaned and treated with rice paste, spun into yarn by spinning wheels, and then dyed, lac being used as a mordant. In the flourishing days of the industry about 64 different tints could be given. The yarn is then adjusted for the warp and for the weft, the former being double and the latter single. The warp is then fixed in the loom, the colored yarn being wound round small sticks which may be about 1,500 in number in richly embroidered shawls. The weaver himself has no idea what he is to produce, but manipulates the sticks according to the dictation of a pattern maker.

EMBROIDERY—PAPIER-MÂCHÉ—OTHER PRODUCTS.

Kashmir still enjoys considerable reputation for embroidery, and beautiful samples of this art are exported and purchased by tourists every year. The talent of Kashmir embroiderers has been turned chiefly into the production of numerous articles embroidered on drill, linen, and cossi silk in darn-stitch with colored washing silk, pushmina, or wool. They are effective and cheap and are in great demand. About 3,000 people are now engaged in this business. There is considerable chain-stitch embroidery of woolen felt rugs from Tibet in colored floral designs. A great deal of imported German yarn is used for the Kashmir embroidery industry, which is also being aided by American sewing machines.

Another interesting industry of Kashmir is the manufacture of papier-mâché, originally introduced from Persia. Under the influence of French shawl agents, papier-mâché boxes were formerly used for containing the shawls exported to France, the boxes being separately sold at high prices. The articles usually made now are picture frames, glove, handkerchief, and stamp boxes, trays, vases, and similar articles. The papier-mâché is made from paper softened

and laid layer upon layer within a mold, by repeated slow drying and adding. After the correct shape is obtained it is wrapped around with cloth and covered with glue. The surface is next smoothed and the ground color is applied. This color may be gold, cochineal, ultramarine, white lead, and verdigris, etc. When the surface is dry the pattern is painted in water colors, and when thoroughly set the whole is varnished with copal dissolved in turpentine. The brushes are made of the hair of the shawl-wool goat and the pencils from the hairs in the fur of the cat.

Other artistic industries in Kashmir, such as woodwork, enameling on brass, copper, and silver by fusing over them various mineral substances, and other kinds of metal work, show a tendency to become less artistic in execution. Those engaged in silver work are using imported alloys in place of silver. It is said that they all possess electroplating apparatus, which they use largely on white metal.

OPENINGS FOR NEW INDUSTRIES.

The home minister of Kashmir, Dr. Mitra, stated in conversation that he thought there would be good openings for factories for woolen cloths, for husking rice by machinery, for grinding oilseeds, for sawing timber, and for flour and other mills. He mentioned that the country is full of willows suitable for producing wickerwork of high standard, cricket bats, and rackets. With the introduction of tanning under modern methods, the hides and skins now exported might be made into shoes, saddlery, and various other leather goods at local factories. Moreover, he thought that instead of being exported for dyeing, silk could be colored with the excellent vegetable dyes of Kashmir, which had already been utilized for shawls with signal success. Raw materials in wood ashes and other vegetable elements, as well as mutton fat, were available for a soap industry. Also perfumery could be manufactured from roses and other fragrant flowers, and tooth powder could be prepared from the abundant orris root. Moreover, match factories should be remunerative in a country of pines, which could also produce turpentine. A great deal of china clay, or kaolin, is available for pottery manufacture. There is a wild olive found nearly all the way on the route into Kashmir, from which oil might be profitably extracted. The numerous medicinal plants of Kashmir could be cultivated, and excellent opportunities exist for the manufacture of pharmaceutical products. He says that the best insect powder he knows of is the powdered kuth root, and that it is better than naphthaline as a preserver of wool, fur, feathers, etc. He mentioned also that apiculture should be a profitable business, as the honey of Kashmir has a specially fine flavor. He thought also that manufacture of paper from wood pulp, the cultivation of sugar beets, cheese making and casein manufacture, and the preserving of fruits and making of jam under modern methods ought to be profitable. He mentioned that a technical school will soon be established in Kashmir and that it is hoped that the artistic and intelligent people of the State will then be trained in modern methods to use the economic resources of their country for the production of manufactured articles. Moreover, it was hoped that the projected ropeway next year would solve the difficulty of transport, while the cheap electric power already available would also help toward a new era of industrial development for the State.

In reply to the suggestion that the official policy of the country had not always been considered friendly to the investment of foreign capital in local enterprises, and especially that it seemed a fact that no foreign company, or even a British company, could own land in the State, Dr. Mitra said that while the Government of the State did not wish to become the victim of any oppressive foreign monopolies and liked to retain ownership of its own land, yet it would gladly welcome any American enterprises which would develop in a legitimate way greater opportunities for employment of the people, and especially those which might utilize some of the large surplus of water power already developed at the large plant near Srinagar. If American capitalists would develop industries in Kashmir such as they have developed near Niagara Falls and other large water powers in the United States, they would assuredly be welcome, and could undoubtedly secure important concessions from the Kashmir Government. Also any industries, such as he had already suggested, would have their permanent establishment in Kashmir regarded with favor by the Government and the people.

IMPORTS AND EXPORTS.

In view of the fact that it is difficult to import or export with profit bulky or perishable goods, Kashmir's foreign trade returns reflect a favorable condition, as regards the potential resources of the country and the industrious character of its population. The total value of goods imported into this State for the period covered by the last trade returns (1910-11) amounted to \$4,635,000, while the value of goods exported amounted to \$3,301,715. The excess in imports for that year was due mainly to material and machinery for road and canal building and irrigation and drainage works conducted by the Government. The chief imports normally consist of cotton piece goods, raw cotton, twist and yarn, metals, oils, salt, sugar, tea, tobacco, and drugs and medicines. The chief articles exported include timber, grain, fruit, silk and manufactures of silk, wool, and woolens, ghee (clarified butter), potatoes, hides and skins, and kuth root.

OPPORTUNITIES FOR AMERICAN TRADE.

Observations in Kashmir led to the conclusion that with the exception of possible business with the Kashmir Government itself or with large contractors for public works, such as the aerial cable-way, the only favorable openings for American trade in this State must be in goods which would meet with a wide general use and which would not be so bulky as to be burdened with excessive transport charges. It would not pay any commercial traveler to visit Kashmir unless he had such an article, for his traveling expenses and the time it would take to make the trip there and back would doubtless result in a net loss. Some American tinned goods were sold in Kashmir last year, but not in sufficient quantities, it is said, to pay the expenses of the commercial traveler who introduced them.

Probably the most influential business man in Kashmir is Mr. Thad Avery, jr., manager of Cockburns's agency, which arranges banking facilities for the State, acts as contractor for public works,

and on behalf of the Government manages the tourist traffic. Mr. Avery, an American who originally came to Kashmir as an employee of the General Electric Co. in connection with the construction of the water-power plant near Srinagar, states that in his judgment the best opening for American trade in Kashmir would be in cotton piece goods. American cotton piece goods are preferred in Kashmir to Indian piece goods if the prices are as low, and he has known them to be lower. He suggested that it might pay American manufacturers of muslins, drills, white longcloth, etc., to cultivate the Kashmir market. An immense amount of white cloth especially is used for native costumes. In fact, practically the entire native population wears most of the time, even in winter, white shirts and white breeches, with white turbans for their head costume. On an average, there are 2 yards of cotton cloth in every pair of trousers worn, 3 yards in every shirt, and 19 yards in every turban. The local cotton piece-goods merchants do business chiefly through a small number of agents who sum up their requirements for the season and place foreign orders accordingly.

GOVERNMENT—TARIFF—RELIGION AND LANGUAGE.

The Maharaja of Kashmir, while conservative in the traditions and customs of orthodox Hinduism, has pushed forward the cause of education, and has advocated its extension to women. On many occasions he has shown himself in favor of enlightened and progressive policies. The Crown Prince, who has just been graduated from Mayo College for Indian Princes at Ajmer, is already noted as one of the promising future native rulers of India. The Maharaja is assisted by a Chief Minister, who is in direct charge of the Foreign Department, also game preservation, trout culture, etc.; by a Home Minister (Rai Bahadur Dr. Mitra) in charge of buildings, roads, irrigation, mining, electricity, dredging, telegraphs, education, police, etc.; and by a Revenue Minister, in charge of public revenues, agriculture, sericulture, forests, kuth root, cattle breeding, etc. The British Government maintains a Resident at Srinagar, to whom all persons desiring to visit Kashmir should apply for passports. No visitor is permitted to cross any frontier of Kashmir State, except where contiguous with British India, without a special permit from the Government of India, and this is not granted except in rare instances. No traveler is permitted to go into Ladakh without a permit. In applying for such permits applicants must state in writing that they have no intention of crossing the frontier into either Chinese Turkestan or Tibet.

Kashmir has its own system of customs duties. Most imports do not pay over 5 per cent. On account of the religious principles of the Hindu population the import of any beef products, tinned or otherwise, is absolutely prohibited.

Although the ruling classes of Kashmir are Hindus, yet Mohammedans form 93 per cent of the total population. In Ladakh a former Buddhistic religion prevails, as in Tibet. The Kashmiri language is spoken in the Jhelum Valley, the Pahari language in the outer hills, and Tibetan in Ladakh. Polygamy is practiced among well-to-do people in Kashmir, and in the district of Ladakh polyandry is practiced, the brothers in the same family especially sharing the same wife.

AERIAL CABLEWAY INTO THE "VALE OF KASHMIR."

It is anticipated that work will soon be begun on what will be one of the most novel undertakings of the world, a great aerial cableway about 75 miles long across the Himalaya Mountain barriers which separate the beautiful and famous "Vale of Kashmir," in the Native State of Kashmir, from the plains of the Punjab in northern India. This will be the longest cableway in the world, the longest at present being one of 22 miles in Argentina. It is expected that this cableway will solve for the Kashmir State the serious present problem of transportation into the rest of the Empire of India. The excessive expense and long time required for transport communication across the mountains has always been a great obstacle to the development of the resources and the growth in prosperity of the people of this State nestled among the Himalayas.

MONORAIL SYSTEM NOT PRACTICABLE.

Owing to the loose conglomerate nature of the soil in this part of the Himalayas, which causes disastrous slips and falling of huge bowlers whenever there is any unusual rainfall, engineers who have studied the situation deem that it is impracticable to build a railway into Kashmir, and that not even a light electric railway would prove feasible. After the invention of Brennan's monorail system of transport the Government of Kashmir hoped that this system would meet the special difficulties of communication across the mountains, and Mr. Brennan, in his experiments with the monorail, was liberally assisted by subsidies from the Kashmir Government. However, it was found that the monorail system would also be impracticable, chiefly because of the sharp turning angles which would be required, and also the danger from slips.

SURVEY AND CONCESSION.

At the suggestion, then, of Lieut. Col. A. J. de Lotbiniere, a Canadian military engineer, whose services had been lent to the Kashmir Government as State engineer, it was decided to investigate the feasibility of an aerial cableway, and, if possible, to encourage private enterprise to enter on this project. The London firm of Forbes, Forbes, Campbell & Co. (head office 9 King William Street, London, with a branch office at Karachi, India), bankers and engineering agents, were induced to undertake a survey to ascertain the possibility of erecting a cableway. This survey has demonstrated to the satisfaction of this firm and of the Kashmir Government that the scheme is practicable and will not be unduly expensive. Accordingly an arrangement has been made whereby this firm will organize a company to undertake the work under a concession from the Kashmir Government, which will subscribe for one-third of the capital stock. It is anticipated that the cost will amount to about \$1,500,000. The sanction of the Imperial Government of India is required for the scheme, but it is not presumed that there will be any difficulty in obtaining this.

OPENING FOR AMERICAN EQUIPMENT.

In discussing with Lieut. Col. de Lotbiniere, at his home in Kashmir, the features of this great scheme, it was mentioned to me that although the work would be undertaken by a London company, yet he hoped, as the cableway would be operated by electricity generated by water power at a station near the town of Rampore, built by an American electrical engineer and equipped with electrical machinery from the United States, which had given every satisfaction, that the London company in the interest of uniformity of electrical equipment would purchase all its electrical machinery and material in the United States.

DETAILS OF CONSTRUCTION.

The cableway will be constructed in big spans of about 800 yards each with fixed cables upheld by iron pillars or towers of latticework, some of which will have to be 100 feet high. There will be separate sections every 5 miles and separate cables, of course, for outgoing and incoming freight, which will be about 9 feet apart and with a diameter of about 1½ inches each. From these cables steel cars will be suspended and conveyed, about 30 to every mile, and holding 335 to 450 pounds each of freight. These cars will be carried over great gorges and precipitous hills, and in some instances there will be a sheer drop underneath them of 1,200 feet. The transfer of cars from section to section will be automatically accomplished by revolving drums which will effect release of the cars and their renewed gripping to the hauling ropes of the next section. On account of the difficulty of expansion and contraction from heat and cold, the cables will be equipped with a complicated system of springs anchored with tremendous weights to make them of the same length all the year round.

ROUTE OF KASHMIR AERIAL CABLEWAY.

Mr. M. de P. Webb, manager of the Karachi branch of the London firm of Forbes, Forbes, Campbell & Co., which has the concession from the Kashmir Government for constructing this cableway, states that His Highness the Maharaja of Kashmir has expressed a preference that the proposed great cableway shall follow the royal route from Srinagar over the Banihall Pass to Jammu, which city is the residence of the Maharaja and his court during the winter season, and that this is the route it will probably follow. It is mentioned that if such decision is definitely reached the ropeway would enter the Vale of Kashmir by Islamabad, which is in the eastern end of the Vale, about 34 miles from Srinagar, the capital, with which it is in easy water communication by the Jhelum River.

The town of Jammu has an elevation of 1,100 feet above sea level, while Srinagar, the capital of Kashmir, has an elevation of 5,250 feet. Jammu is on a plateau 300 feet above the Tawi River, and is the terminus of a branch line of the Northwestern Railway. The road between Jammu and Srinagar goes through magnificent mountain scenery, following for 9 miles the precipitous cliffs of the Bichlari gorge, the roadway being about 1,000 feet above the stream flowing immediately below. The Banihall Pass, through which the road

goes by a steep zigzag climb, has its lowest crest at 9,236 feet above sea elevation. From the summit of this pass the eastern side of the Kashmir Valley is visible. The ropeway by this route would cross the Chenab River. The total distance by the present royal road between Jammu and Srinagar is about 171 miles, but it is probable that the cableway, making many short cuts, might materially shorten the distance; moreover, it might be considered unnecessary to build the cableway between Islamabad and Srinagar, between which there is river communication, and if this were not done 34 miles would be saved.

It was expected that construction work on the cableway would begin in 1914, but apparently the various great engineering problems connected with the project have caused some necessary delay.

A REMARKABLE ROADWAY.

At present the chief means of communication in and out of Kashmir is by road about 200 miles long between the city of Rawalpindi, in northern Punjab, and Srinagar, the capital of Kashmir. This road over the mountains is one of the most remarkable in the world on account of the engineering difficulties which it presented, being cut much of the way round huge precipices, sometimes through solid rock, and frequently being overhung by huge masses of conglomerate soil containing great boulders always liable to fall whenever rain starts. This road took four years to construct, being completed in 1887. Fifty-four men were killed during its construction, chiefly by being carried away by slips down precipices or being struck by boulders, while about 20 more died of snake bites. At present the annual cost to the Kashmir Government of maintaining this road amounts to about \$500 per mile, chiefly spent in repairing slips and some bridges which are washed away. Sometimes after a heavy rainfall as many as 300 slips will occur within 24 hours.

In traversing this road into the Kashmir Valley I was impressed with the powerful arguments why the Kashmir Government has not seen its way clear to constructing a railway along this route. After reaching a halfway station in the evening, a sudden storm arose and heavy rain fell during the night. The next day on proceeding toward Srinagar as many as three or four slips of a serious nature were encountered, while over 20 big boulders had fallen onto the road during the night. On my return journey the following week a disabled motor car was found on the road which had been struck by two falling boulders. A few months ago a serious tragedy occurred, a boulder falling in front of a team of horses, causing them to shy and the occupants of the vehicle to be hurled over the precipice and killed. The great advantage of the aerial cableway will be that all dangerous parts of the road can be dodged and the cars moved from hill to hill and over gorges instead of at the side of them, the towers being based at places where there can be no danger of slips.

INITIAL ENTERPRISE LIMITED TO FREIGHT.

It will not be the intention at first to use the aerial cableway for transport of passengers, but only for freight. However, if the cableway works with perfect safety and no accidents occur it is likely

that within a year or two it will be equipped with cars suitable for transporting such passengers as may be willing to try this mode of traveling, which should furnish sensations not unlike that of aeroplaning.

At present nearly all freight going in and out of Kashmir is transported on bullock carts, which can not get over the distance between Rawalpindi and Srinagar in less than 15 days, even with no rain and under the most favorable conditions. The cost of transporting goods between these two cities amounts to as much as \$25 per ton and raises the cost of the goods at their destination to two or three times their original cost. In fact, the cost of transportation is prohibitive for a large class of articles which might otherwise be exported or imported over the mountains. By the aerial ropeway it is estimated that goods will travel 5 or 6 miles per hour and, by short cuts from the present road, be over the ropeway within 15 hours, while being propelled by cheap water power the cost of transport would be an insignificant charge against the cost of the goods transported.

VAST RESOURCES.

At present the Kashmir Valley and surrounding territory comprised within the State of Kashmir has great resources for agricultural development, fruit growing, goat, sheep, and cattle raising, and in its magnificent forests, many of them containing silver fir and pulp woods suitable for paper manufacture, but possibly the greatest asset of all is water power. Lieut. Col. de Lotbiniere estimates that probably 1,000,000 horsepower could be developed from falling water within the State. The main river of the State, the Jhelum, within 100 miles has an average fall of 50 feet per mile, with a minimum flow of 3,000 cubic feet per minute. But until the transport difficulty is solved it is useless to develop more water power, as excessive cost of transport of goods manufactured would more than neutralize the advantages of cheap production through water power. At present about the only goods it pays well to export from the State are silks and various classes of art goods which have a high value in proportion to bulk.

The State of Kashmir has already an important water-power development near the town of Rampore, which was completed a few years ago under the general direction of Lieut. Col. de Lotbiniere, with construction operations under charge of Mr. A. C. Jewett, a citizen of California and a former employee of the General Electric Co., of Schenectady, and now acting as chief engineer for the Amir of Afghanistan in a water-power project near Kabul. There is a large power house here, the power being obtained from the Jhelum River, which is diverted about 8 miles higher up into the canal, running partly on the surface but mostly in a wooden tube or flume, 8 feet square, which runs along the hillside. The fall at the power house is about 500 feet, which is sufficient to work turbines of some thousands of horsepower. The electric power generated here is only a small part of that available and is used chiefly for some important dredging works at Baramula and for electric lighting and industrial purposes at Srinagar, the capital. The chief industrial use there for this power has been in connection with a large silk factory employing about 4,500 persons, which had been destroyed by fire.

DREDGING—RECLAMATION OF RICH LAND.

The dredging operations near Baramula, for which electricity generated from this water power is used, deserve special explanation, as they furnish another instance of interesting and novel great engineering enterprise for which the State of Kashmir may well be distinguished. The object is to widen the Jhelum River at its exit from the Kashmir Valley, where the gorge is now so narrow that it is difficult for the water to escape with sufficient rapidity to prevent serious floods over the valley. The widening of this exit will lower the Woolar Lake, a large body of water within the valley, by about 14 feet, and about 90,000 acres of good land will be reclaimed for agriculture. This land will be worth over \$80 per acre, so that the total value of the land reclaimed will be about \$7,200,000, while the cost of the drainage work will be about \$3,100,000. The lake has already been lowered about 6 feet and will be lowered about 8 feet more. The Jhelum River orifice through which this lake water escapes is to be given an average width, partly in paralleling canals, of 225 feet, which involves dredging for about 18 miles altogether about 16 feet deep, 4 miles of the way through very rocky ground.

AMERICAN EQUIPMENT—NEW ERA OF PROSPERITY.

To accomplish this great work, two hydraulic, two derrick, and one dipper dredge, made by the Bucyrus Co., of Milwaukee, had to be set up near Baramula, the various parts from which they were constructed having to be conveyed under circumstances of great difficulty over the Himalayas a distance of 200 miles. The dipper dredge from Milwaukee is said to be the first one that has ever been operated by electricity. The electric motors also came from the United States. The dipper dredge from Milwaukee has done a wonderful work, its huge buckets tearing their way through rock, breaking off some single pieces of rock weighing over 31,000 pounds. It is expected that this work will be completed early in 1915.

With the completion of these great dredging operations and with the construction of the great aerial cableway which it is hoped will solve the transport problem, both great works owing their prospective success to cheap water-power development already accomplished, it seems probable that a new era of prosperity will open for the world-famed "Vale of Kashmir."

BENARES.

While en route from Simla to Calcutta I stopped off at Benares, on the River Ganges, to note any trade conditions which might be of special interest at this famous sacred city of the Hindus.

The city of Benares is under the administrative control of a Commissioner (at present P. Wyndham, Esq., I. C. S.), appointed by the Government of India. It has a population of about 200,000, although at certain times of the year, when there is a special inrush of pilgrims on account of holy festivals, the normal population may be doubled. The city is the chief center of the Benares district of the United Provinces. The entire district, covering about 1,000 square miles, until quite recently was under direct British rule, although a native

prince or Maharaja residing near the city of Benares had powers of taxation for the maintenance of his court. It was lately decided, however, as the result of representations made to the British Government by the Maharaja, to intrust His Highness with full power and authority for governing all of this district with the exception of the city of Benares itself, subject to a certain amount of advice and guidance on the part of the Commissioner of Benares and to various safeguards for the liberties and privileges of the people as already enjoyed under British rule.

His Highness the Maharaja, during the three or four years in which he has been intrusted with such important responsibilities for the prosperity of his people, has apparently done all that was within his power to justify the confidence imposed in him by the British Government, especially by promoting agriculture through new irrigation canals and other works, by improving sanitation, so as to decrease the death rate, and by planning new industries, such as flour mills, sugar refineries, and oil-seed presses.

INFORMATION AS TO AMERICAN TOOLS, MACHINERY, AND MOTOR CARS DESIRED.

In conversation with the Chief Secretary of His Highness' Government (Col. Vindhessari Prasad Singh) he mentioned that the Government desired a better knowledge concerning certain American machinery and tools which might prove useful in this State. For instance, he stated that it was the intention to foster sugar cultivation and to start a refinery with a capacity of 400,000 to 800,000 pounds of sugar per year, installing the best modern machinery obtainable, and that information from American manufacturers of such machinery would prove very acceptable. It was also thought desirable to introduce simple machines for cutting up chaff or straw for cattle feed, also for grinding gram and other grains for domestic consumption, and any hand-power machines made in the United States for such purposes would be well adapted to the local farmers' needs. Also the use of simple and cheap types of hand pumps or of improved pumps which might be worked by bullocks would undoubtedly prove of great benefit to hundreds of agriculturists who could not afford to buy oil engines, windmills, or other expensive machines for pumping, but who greatly need some cheap substitute for their laborious and uneconomical methods of drawing water from wells and canals for irrigation.

It was mentioned to me that the Maharaja took considerable interest in modern improved mechanical appliances. At his palace at Ramnagar, near Benares, there is an electrical plant with a 300-horsepower Diesel oil engine which provides electricity for lighting the palace and other Government buildings. It is the intention shortly to purchase several more engines and to use them for pumping water, making ice, etc. His Highness at present has eight motor cars, four English and four French. The particular merits of American automobiles have not yet been drawn to His Highness' attention. It is desired, however, to secure some information concerning American machines before any further purchases are made.

CHEAP AND SIMPLE ARTICLES NEEDED—CEMENT PLANT.

The Chief Secretary mentioned that a good market could be developed in the country districts of Benares for many cheap and simple farm implements and machines, such as could be demonstrated to have real utility in saving labor and expense and which would not have to be considered by the people merely as interesting toys. Owing to the absence of large workshops in Benares for repairing machinery or implements and also because of the deficient mechanical knowledge of the people, any machines or implements offered for sale here would have to be such as could not quickly get out of order, or, if broken, could at least be easily repaired by village carpenters with limited facilities.

The Chief Secretary would welcome correspondence with American manufacturers relative to articles suitable for this State. He did not think that with the present small independent holdings of land (probable average about 6 acres) around Benares there could be much demand worked up for American metal plows as a substitute for the primitive native plows now used, but that possibly a few of them might be sold. He mentioned that oil engines of 5 to 10 horsepower might be employed cooperatively for irrigation, but he thought that in most instances improved hand pumps would be considered useful and desirable by most agriculturists. He stated that it is the policy of His Highness' Government to introduce modern machines, implements, and methods into the State as fast as possible; but as the people are both poor and conservative it is uphill educational work to convince them that what their grandfathers and fathers had done before them could be improved upon by outside ideas and methods.

The commissioner at Benares, Mr. Wyndham, said that he thought one of the greatest needs of Benares was the establishment of a factory for making cement; that the use of cement for building purposes was increasing extensively, but that it all had to be imported from foreign countries, although material for making it was near at hand. He suggested that some American capitalist might like to investigate the possibilities for such an industry at Benares.

GOOD DEMAND FOR PHARMACEUTICAL PRODUCTS.

Benares, being a holy city, is visited each year by thousands of Hindu pilgrims from all parts of India. Many of these pilgrims are invalids who have a desire to finish their days at Benares and, after death, to have their remains cremated on the banks of the river and the ashes given up to the "holy mother Ganges." It is a common sight at Benares, especially early in the morning, to see such unfortunates laid out to die by the river bank, and as soon as the end comes cremated and thrown into the stream. The large number of invalids at Benares has caused the erection of 14 hospitals within the city.

On account of the great prevalence of illness of various sorts among the incoming pilgrims and among other residents who catch diseases from them (conditions along the river being very insanitary) there is a large trade in medicines. On inspection of several of the numerous native drug stores in Benares I noticed that many American patent medicines were sold, as well as preparations made in England and Germany and also locally. Homeopathic medicines seemed espe-

cially popular. The native doctors apparently have no hesitation in prescribing foreign medical preparations, together with their own native remedies—some of which have undoubted value.

The business in patent medicines at Benares is carried on chiefly through large distributing houses at Calcutta. The small retail shops, while desirous of obtaining credit, are usually obliged to accept strictly cash terms in making purchases of new stock. The greater number of the invalids making pilgrimages to Benares are primarily troubled with some form of malaria, so that the preparations most in favor with them are those that contain quinine and have tonic properties generally. Many deaths also occur from cholera, dysentery, small-pox, and plague, diseases which seem always endemic at Benares, and especially attack those already weakened by other illnesses. The death rate for the past 10 years is said to have averaged over 40 per thousand, and in years of specially severe cholera and plague epidemics to have been as high as 75 or 80 per thousand.

FISHERIES—AGRICULTURE—BRASS MANUFACTURES.

The Ganges is the great thoroughfare of the city and surrounding district. The river craft are either row or sail boats. The only motor boat at present in use at Benares is a fine one owned by the Maharaja. There are no motor cars in the city except those owned by the Maharaja and probably half a dozen owned by British officials. The fisheries of the district are of some importance and there is a strong demand for fish of all the ordinary species in the markets of Benares, while the great bulk of the population in the rural tracts readily eat fish when obtainable. The supply is derived partly from the few permanent lakes, but principally from the Ganges. The chief season for fishing is the hot weather, when the water is low and clear. Fish are caught by hook and line, by nets of varying mesh and dimensions, and by reed or wicker traps and baskets. The returns of the last census showed only 467 persons who depend principally on fishing and fish dealing, but this fails to represent the actual state of the case, as practically all persons employed in boats on the river betake themselves to fishing when occasion offers.

Agricultural conditions in the Benares district are not essentially different from those of other parts of northern India. About 50 per cent of the cultivated land is irrigated by wells and canals. The principal crops are rice, barley, wheat, maize, gram, pulse, and other varieties of grain. The chief property of the agriculturists, besides small holdings of land, are their cattle, comprising mainly buffaloes, cows, and bullocks. These animals are used for plowing, pumping water, pulling carts, and for milk, especially for converting into ghee (clarified butter).

In Benares city the only industries of importance are manufactures of brass and of cotton and silk textiles. There are over 600 brass factories in the city, the larger concerns employing 20 or more men. The skilled artisans command high wages, and are paid according to the amount of work done. The raw material is generally imported and the alloys made on the spot; the best makers preserve the secret of the proportions of copper, zinc, and other metals used to produce brass, and also of the fluxes, coloring matter, and solders employed

Water receptacles, candlesticks, and articles for religious use, temple and house decoration, and personal adornment are the chief products. The distinctive feature of Benares brasswork is its rich golden hue. There are many gold and silver smiths in Benares who turn out silverware and jewelry of a fair order. There has lately been much imitation of jewelry in brass and German silver. The demand for these articles is chiefly local, especially among women pilgrims.

SILK AND COTTON TEXTILES.

About 25,000 people are employed in the cotton and silk textile industries. The output consists chiefly of the coarser kinds of cotton cloths or muslins, either plain or adorned with stripes and floral pattern, and of silk fabrics, comprising every variety of silk except velvet and ranging from the very coarse and undyed to the most elaborate brocades. These latter are widely known, and are exported not only to all parts of India but also to Europe and America. They assume an infinite diversity of form and pattern, but the groundwork is invariably of strong silk, three to seven layers of warp threads being laid down. Sometimes this is entirely hidden by a second groundwork of gold or silver thread, over which is worked a floral or other pattern. If the pattern be omitted, the result is plain cloth of gold or silver; but in simpler specimens the silk groundwork is allowed to appear, the pattern being woven in gold or silver thread, sometimes combined with silks of various colors. These patterns are often geometrical, but in other cases a floral design is selected, the effect in the more elaborate pieces closely resembling embroidery. These fabrics are very heavy in texture and are seldom used for garments.

There is a considerable output of plain and flowered silks of all degrees of fineness. Many native garments never pass through the hands of a tailor, but are woven in the form in which they are to be worn. There is also a considerable manufacture of fancy borders, usually done in bright floral patterns, for attaching to garments and caps in place of the border woven in the same piece. Besides articles in pure silk, the looms of Benares are noted for the production of mixtures of wool and cotton chiefly for the use of orthodox Mohammedans, who are forbidden to wear garments of silk alone. The best known is styled "mashru," meaning "permitted."

Closely connected with silk weaving is embroidering, partly in silk, but more commonly in gold or silver thread. About 2,000 persons are engaged in the manufacture of gold and silver thread fabrics. The genuine thread is made from pure silver, a thin bar being passed in succession through smaller and smaller holes in an iron plate until it is only one-twelfth of an inch in thickness. It is then drawn into fine wire by a wheel-and-axle apparatus, and finally flattened with a light hammer before being wound spirally around a strong silk thread. Gold thread is obtained by coating the wire with gold as it undergoes the final process of extension. Such thread is, however, used only for the best work. Adulteration by copper or even lead is frequently practiced, while turmeric is often used to impart a brilliant color to a thin coating of gold. In some cases, too, foreign thread of inferior quality, for the most part imported from Russia, is employed, but this is never used for the highest grades of weaving or embroidery.

A more recent innovation is the growing import of high-class gold thread from France, especially from Lyon. In connection with the embroidering and tailoring trades at Benares, American sewing machines are now becoming much used.

BENARES TRADE BEST REACHED THROUGH CALCUTTA.

The chief imported wares used at Benares are cotton piece goods from England, Germany, and from other parts of India. The pilgrim trade is very important, and at times of great religious festivals large fairs are held, when articles especially connected with Hindu worship, including mats, beads, prayer bags (for holding beads), ornaments for idols, etc., as well as children's toys, lamps, penholders and pens, pins, buttons, and a few simple articles of hardware, are sold.

There are no large factories in Benares worked on European lines, nor are there any shops owned by Europeans. While Benares is a good city for the introduction of imported articles on account of returning pilgrims tending to spread the use of such articles in their own localities, yet, generally speaking, except possibly in the case of cotton piece goods or of articles required for Government use, it would probably be best for American manufacturers to do business with this city and district chiefly through large wholesale distributors at Calcutta, who may be familiar with individual conditions of credit and who are already in command of this trade.

Benares is a center of orthodox Hinduism, with peculiar prejudices against any foreign articles made by hand or in which there is any use of animal fat. It is the chief seat of Hindu religious education, and has several important Hindu colleges. Money is now being raised for the endowment of a great Hindu university here. The city contains a large number of printing presses, connected with the publishing of books and periodicals chiefly of a religious character.

KAPURTHALA.

His Highness the Maharaja of the Native State of Kapurthala and his suite are at present (May, 1915) visiting the United States. This State consists of three detached pieces of territory in the great plain of the Doab, in the Punjab. His Highness was granted the title of Maharaja as an hereditary distinction in 1911. The chiefs of Kapurthala are Sikhs. Only a small proportion of the population of the State, however, are Sikhs, the majority being Mohammedans. The chief crops are wheat, gram, maize, cotton, and sugar cane.

The town of Sultanpur is famous for hand-painted cloths. The main line of the Northwestern Railway passes through part of the State and the Grand Trunk road runs parallel to it. A branch railway from Jullundur City to Ferozepur passes through the State. Kapurthala maintains a battalion of Imperial Service infantry and a small force of local troops. The capital is Kapurthala, which is said to have been founded in the eleventh century.

BALUCHISTAN.

As comparatively little has ever been written concerning Baluchistan from a commercial and industrial standpoint, and as even American textbooks on geography contain only meager references to this country, I made, in August, 1913, a short side trip here from British India proper, with a view to investigating trade conditions.

This country—which is bounded on the north by Afghanistan, on the west by Persia, on the south by the Arabian Sea, and on the east by the British-India Provinces of Sind, the Punjab, and a part of the Northwest Frontier Province—covers a total area of 131,855 square miles, populated, according to a census taken in 1911, by only 834,703 people, or an average of 6.4 to the square mile.

POPULATION AND POLITICAL DIVISIONS.

The following interesting general statement concerning Baluchistan appears in the census report of 1911:

The contrast between Baluchistan's imposing area and its modest population is almost grotesque. A scanty rainfall and lack of perennial water are enough in themselves to make a sparse population a foregone conclusion, yet the extraordinary sparseness of the population will probably come as a surprise to most people who have any conception of the vastness of the country. While 834,703 souls, all told, were actually enumerated during the census, yet, if we are seeking to gauge the normal strength of Baluchistan, we should in fairness add somewhat to this humble total; for the country, largely inhabited as it is by nomadic peoples, is extravagantly affected by the nature of the seasons. Given a good season, it will attract thousands from across its borders; given a bad season, it will send them back, with many thousands of its own besides. When this census was taken, the season was not very favorable.

Though there is not much difference between Baluchistan and the Punjab in area, the Punjab lost considerably more people from plague alone in the last four years than can be found to-day in the whole of Baluchistan. So vast is Baluchistan that if the British Isles, Channel Islands and all, were lifted up and dumped down on it there would still be room for over 13,000 square miles of surrounding sea. So insignificant is its population that it falls far short of the births in the British Isles in a single year.

Baluchistan is politically divided into two main parts: (a) A strip of country on the north (53,821 square miles in extent), which since 1879 has been under direct British control, part of it by cession from Afghanistan after the second Afghan War and part of it acquired by lease from the Khan of Kalat, the large Native State to the south; and (b) a much larger area (78,034 square miles) included within the two Native States of Kalat (71,590 square miles) and Las Bela (6,441 square miles), which front on the Arabian Sea. In area, the Khanate of Kalat represents over half of Baluchistan; nevertheless, in population and general importance the strictly British territory to the north is worthy of most consideration, and is the only part that shows any signal advancement. While the British Government maintains political agents or residents at Kalat town, the capital of Kalat, and at Bela, the capital of Las Bela, their intervention in these States is confined mostly to occasional arbitration of intertribal disputes.

CHIEF CITIES—CLIMATE.

The city of Quetta, located in the northern British strip of territory, on land leased from the Khan of Kalat, is practically the capital of Baluchistan, being the residence of the British Agent to the Governor General of India in Baluchistan. By railway it is 536 miles from Karachi in Sind and 727 miles from Lahore in the Punjab, with which cities there is a daily train service. Quetta is strongly fortified and has a garrison of about 10,000 troops. Besides the troops stationed here in the military cantonment, their families, civil officials, trades-people, etc., numbering in all approximately 17,000, there is a further population of some 17,000 living in the native town and suburbs. This city is at an elevation of 5,500 feet and has a cool, pleasant summer climate. In winter it is often cold enough for snow to fall. A few miles to the north of Quetta, in the Hindu Kush Mountains, is located Ziarat hill station, at about 8,500 feet elevation, where the summer climate is still cooler. Ziarat is the summer residence of the leading civil and military officials of Baluchistan.

The second largest town in Baluchistan is Sibi, at the edge of the Sind desert, close to the Indian Province of Sind, with a population of 6,600. Sibi is noted as being the hottest town in summer of any place within the British possessions in Asia; in winter, however, it is severely cold. In Sibi the mean summer temperature is 97°, while in Quetta it is 79°. Until about 1880, Quetta was only a village, instead of being as now the largest and most important town of Baluchistan. In old-fashioned American geographies Quetta is not mentioned, but Kalat, capital of the Khanate of the same name, is described as Baluchistan's capital and largest city. The census of 1911 gave the town of Kalat a population of only 2,000, while Bela, the capital of the much smaller Native State of Las Bela, had 3,000.

TOPOGRAPHY—NORTHWESTERN RAILWAY.

Baluchistan is tributary in a trade sense to Karachi in northwestern India, and business is carried on chiefly through agencies of Karachi or local firms which buy at Karachi. The native shops are in the main kept by Hindus from the Punjab or by Afghans. A few such shops may buy direct in India, but most buy at agencies at Quetta. It takes about 16 hours to go from Karachi to Quetta by the Northwestern Railway, which traverses the Indus Valley for several hundred miles and then crosses due west into Baluchistan. At the time I made this journey (in August) the temperature in the Sind desert was 120 degrees, and the air was full of blinding dust. The traveler who has left the plains of India and enters the passes of Baluchistan finds the country much different in appearance. Rugged, barren, sunburned mountains, rent by huge chasms, alternate with arid wastes and stony plains, but as Quetta is approached the country is redeemed in places by level valleys of considerable size, in which irrigation enables rich crops of all kinds, especially fruit, to be raised.

The railroad into Baluchistan was originally built by the Northwestern Railway, owned by the Government of India, more from a military strategic standpoint than with a view to its commercial importance. This line goes through the Bolan Pass, which, like the Khyber Pass on the northwestern frontier of India, has extensive

fortifications to protect India from a land invasion. It extends to New Chaman, within 2 miles of the Afghanistan boundary line, at which place are kept supplies of track and other railway material, so that in an emergency the line could at once be continued to Kandahar in southern Afghanistan. Near New Chaman the railway goes through the Khojak Tunnel, 2½ miles long. The railway system of Baluchistan is under strong military guard all the way. There is no doubt as to its important civilizing influence on many of the wild tribes of the country it traverses.

IMPORTS AND EXPORTS.

The exports of Baluchistan consist principally of fresh and dried fruit, wool, drugs, fish, shark fins, and mats, while the imports include chiefly cotton piece goods, metal ware, tea, sugar, and canned goods. There are no customs statistics to show the import and export trade of Baluchistan as a whole, but statistics show the land trade from British territory with the Native States of Kalat and Las Bela. During 1912-13 the imports into Kalat and Las Bela amounted to \$19,100, and the exports from Kalat into British Baluchistan to \$120,742; no statistics are available to show the sea trade.

The only good road in these Native States is a metaled road 88½ miles long between Kalat and Quetta. I understand, however, that at the suggestion of the British Resident the Khan of Kalat is preparing to expend some of the revenue which he receives from the British Government for leased territory on roads for the development of his domain.

Baluchistan at present derives its commercial importance perhaps more from the trade routes it offers into Persia and Afghanistan than from its own ability to buy or sell goods. While Baluchistan itself has less than 1,000,000 inhabitants, it provides about the most feasible routes which now exist for tapping Persia with an estimated population of 12,000,000 people, and Afghanistan with an estimated population of 5,000,000 people. (No population censuses have ever been taken of Persia and of Afghanistan.)

INDO-PERSIAN TRADE THROUGH BALUCHISTAN.

The trade between India and Persia via Baluchistan has gained considerably during the last year or so because of disturbances in the southern part of Persia that rendered unsafe the ordinary trade routes from towns on the Persian Gulf to districts in the north. Nushki in the central part of northern Baluchistan, on a branch of the Northwestern Railway from Quetta, has now become the emporium of an important trade with Persia and with western Afghanistan. Through this Nushki route, goods valued at \$647,919 were exported to Persia in 1912-13, and goods valued at \$141,715 were imported therefrom, this representing a gain over 1911-12 of 19 per cent in exports and 38 per cent in imports. Caravans now come to Nushki from Meshed in Persia and from Herat in northwestern Afghanistan, and some of the goods sold in its bazaars find their way even into Russian territory to the north of Afghanistan. There is a large export from here of cotton piece goods, metal ware, leather manufactures, etc. A rebate of two-thirds of the actual freight charges

is granted by the Northwestern Railway on all goods (including live stock) proceeding to or from Persia which are booked between Nushki or Quetta and any station on its line, provided the minimum freight concerned is in excess of \$1.75. The same concession also applies on goods booked to Nushki and destined for markets in Afghanistan.

Persian traders visiting India on business, who have provided themselves with consular recommendations are granted railway passes over the Northwestern Railway in Baluchistan and India, and over the East Indian Railway in India. The caravan route from Nushki in Baluchistan goes due west into the Seistan district of eastern Persia, thence north into the populous districts of Khorassan and Meshed in northeastern Persia. The British sphere of influence in Persia, according to the convention signed with Russia in 1907, extends south of a line drawn from the intersection of the Russian and Afghan frontiers on the Persian frontier through Yezd and Ispahan, ending in Kasr-i-Shiran. This sphere of influence applies chiefly to concessions of a political or commercial nature, such as for railways, banks, telegraphs, roads, transport, insurance, etc. However, it does not apparently restrict British trade to the country south of this line, and much of the present business through Nushki in Baluchistan seems to extend into sphere of Russian influence.

THE NEED FOR IRRIGATION.

Baluchistan lies outside the monsoon area, and, with a rainfall exceedingly irregular and scanty, depends chiefly upon irrigation for its crops. In many places, however, where water can be applied the most beautiful gardens can be produced, like those in Persia. The difficulty throughout the country is to find a sufficient and convenient water supply. Most of the rivers are dried up much of the time, but any rainstorm will cause sudden floods that do great damage to roads and railways. For about 10 days in August Baluchistan was entirely cut off from rail communication with India by disastrous washouts along the line of the Northwestern Railway.

A unique system of irrigation is practiced in Baluchistan by means of "karez," or underground tunnels, driven into hill slopes, which, acting as subsoil drains, carry the water out to the surface. Their cost varies, according to their size and the soil in which they are excavated, from \$600 to \$3,000. Wherever springs are found they, too, are utilized for irrigation. A few steady streams are thus used, likewise a few wells irrigating about 5 acres each. Under an organized method of cooperation the cultivators along the Nari River annually construct immense earthen dams for raising the water level.

MILITARY SUPERVISION OF PUBLIC WORKS.

Artesian wells and pumps at carefully selected localities offer probably the best means of promoting the agricultural development and prosperity of Baluchistan. Public works, especially improved irrigation throughout Baluchistan, are under the control of the commanding royal engineer, fourth (Quetta) division, military works services, and secretary to the agent to the Governor General in the

Public Works Department (Quetta), Baluchistan. All the civil and military works are supervised by military officers, except certain civil works at remote places, which are supervised under orders of the British Political Agent, the estimates and plans being scrutinized by military engineers. There is a special irrigation officer on deputation from the Punjab for supervision of irrigation works.

During the official year 1911-12 there was a grant from the Public Works Department of the Government of India of about \$106,000 for special irrigation works, including construction of dams, reservoirs, canals, tools, and plant, and for experimental irrigation by artesian-well borings and by pumping. As these projects become completed and successful there will probably be further outlays for irrigation works wherever practicable.

PRINCIPAL CROPS.

Most of the people of Baluchistan are nomadic and dependent for their livelihood on a casual kind of agriculture and raising live stock. Since a large part of the cultivable area is unsuited to permanent irrigation, yet having a rainfall usually irregular and unsatisfactory, there may be fair crops perhaps only once in five years.

The largest and most important crop is spring wheat, which forms the staple food grain of the people. Barley is another spring grain that is largely grown. Maize, or Indian corn, was introduced into the country from the United States by one of the British political agents about 20 years ago, and is now the chief autumn crop in the highlands, while jowar, a kind of pulse, is the main autumn crop in the plains. Other important crops are lucerne, or alfalfa, millet, potatoes, Indian tobacco, and melons.

Dates are a sole crop in some districts. Special attention is paid to the cultivation and care of date trees, of which there are more than 100 varieties. The most common way of preserving the dates is by pressing and packing them in palm-leaf baskets. The better kinds are mixed with extracted date juice and preserved in earthen jars. On irrigated lands, especially in British territory near Quetta, the cultivation of such fruit as melons, grapes, peaches, pears, nectarines, and apples, and of tomatoes, potatoes, and other kinds of vegetables is now making rapid progress.

AGRICULTURAL IMPLEMENTS IN USE.

The principal implements of agriculture in Baluchistan include plows similar to those used in India, but somewhat lighter, owing to greater softness of the soil. They are drawn by oxen, donkeys, or camels. A heavy log is used as a clod crusher. For making large embankments, a plank about 6 feet long and 2 feet wide is employed. Small embankments in irrigated lands are made with a large wooden spade, which is worked by two men with a rope. Shovels of an improved pattern are now in use near Quetta. Pickaxes with broad, flat blades are also much used.

A 4-pronged fork is used for winnowing and for cleaning straw. Efforts have been made, but without success, to introduce a plow drawn by horses. The fruit experiment station at Quetta in March, 1913, issued a bulletin on the cultivation of tomatoes, in which it recommended an American make of double-wheel hand hoes in order

Special Consular Reports, No. 72.



FIG. 17.—WINNOWING WHEAT, BALUCHISTAN.

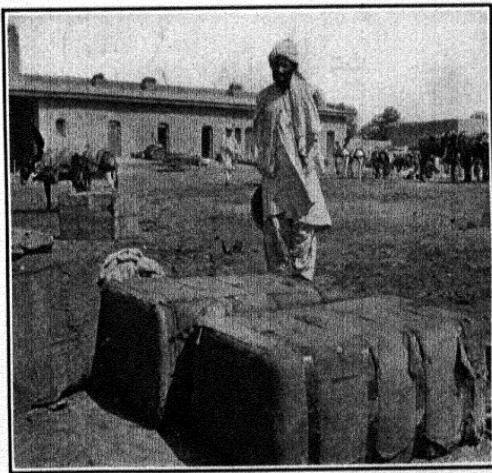


FIG. 18.—COTTON GOODS AT QUETTA, BALUCHISTAN.
THESE GOODS WILL HAVE TO BE UNPACKED AND
MADE UP INTO SMALL PARCELS FOR TRANSPORT
ON CAMELS OR DONKEYS INTO AFGHANISTAN.

Special Consular Reports, No. 72.

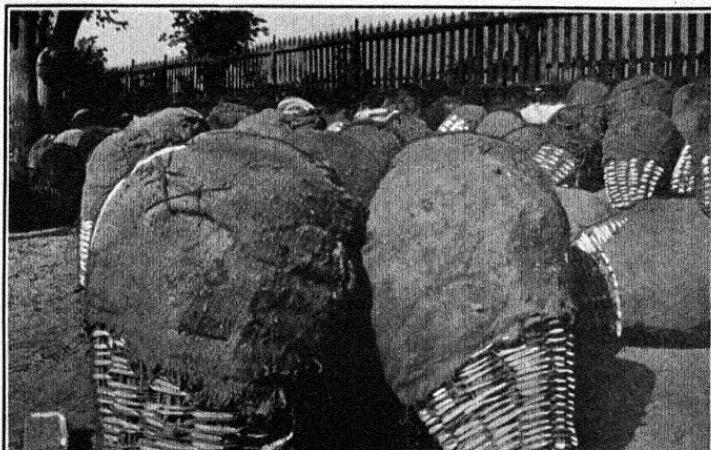


FIG. 19.—FRUIT PACKED FOR TRANSPORT BY CAMEL OR DONKEY, AFGHANISTAN.

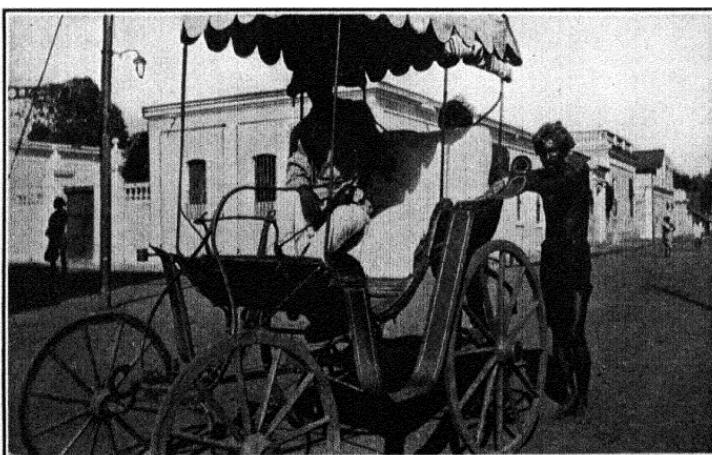


FIG. 20.—THE "POUSSE-POUSSE," A CURIOUS PUSH CARRIAGE AT PONDICHERRY, FRENCH INDIA.

to maintain a dry surface mulch on the beds and around the plants and to keep down all weeds, the labor involved in this being much reduced by these American hoes, which can also be used to break up the crust which forms on the floor of the furrows as these dry.

The census taken in Baluchistan in 1911 showed that there was a plow and a pair of oxen to almost every dozen inhabitants, the number of plows being 75,924 and the number of oxen 139,304. Among other tools used in the country, mainly for agriculture, are rakes for collecting grain and straw scattered on the thrashing ground, axes, and handsaws, chiefly of English manufacture.

GOVERNMENT AGRICULTURAL LOANS—LIVE STOCK.

Agriculture on British territory is now assisted by loans from the Government of India at the rate of 6½ per cent per annum, advances being ordinarily limited to about \$300. When the British official is satisfied that loans will lead to increased revenue which, within the time fixed for the complete repayment of the advance, will amount to not less than the whole interest which should have been charged under the rules, he is at liberty to grant the advance free of interest. The agriculturists also largely finance each other by mortgage loans.

The 1911 census taken in Baluchistan showed 55,087 camels, 51,614 donkeys, and 14,044 horses in the country. Camels are the most common animals for transport, and sometimes they are used for plowing. Camel breeding is an important pastoral industry. The donkey is employed by nomads for transport and in the northern tracts for plowing. Most of the good donkeys are transfrontier animals and come from northern Afghanistan, Bokhara, and Persia.

Sheep and goat breeding is also an important industry. The indigenous breeds of sheep are the thick-tailed hornless variety, generally white in color and of low build, being practically the same as those of Afghanistan. The price of sheep's wool depends upon the Karachi market, to which it is exported, and exhibits considerable variations from year to year. The wool is naturally white and soft, but is exported unwashed. The goats in the country are generally black and are characterized by remarkably long ears. A goat produces about 12 ounces of hair each year, a sheep 3 to 5 pounds of wool, and a camel 1 to 5 pounds of hair. Goat hair is used by nomads for making ropes, blankets, and sacks, and camel wool or hair is employed for making sacks, while sheep's wool is used locally for making felts for clothing and bedding and rugs.

HORSE AND CATTLE FAIRS—TYPICAL DWELLINGS.

Herds of sheep and goats find fodder in a variety of leguminous plants, bush growth, etc., as no large quantity of grass exists in the greater part of the country. Horses and bullocks subsist chiefly on the straw of cereals. Camels feed on certain common plants like amarisk and are also fond of browsing on trees.

Horse and cattle fairs are held at Sibi in February and at Quetta in September. The former is chiefly a breeders' and the latter a dealers' fair. About 1,800 horses are brought to these shows, and prizes to the value of \$2,000 are given. At the Quetta fair many

Persian horses are brought for sale. Some of the Baluchistan herds of horses are exceptionally good.

The characteristic dwellings in Baluchistan are mud huts and black blanket tents. The dwellings are usually partitioned in the center, the family living on one side and the flocks and herds on the other. At the back of the family section are piled the felts and quilts used for bedding; the other furnishings consist of wooden bowls, earthen pots, a flat stone griddle for baking, and a few skins for water and grain. Permanent dwellings are numerous only in those parts where they are required for protection from the climate or where there is much cultivation.

The house of a well-to-do person generally consists of a courtyard with three rooms in a line. They always face east or south, and consist of a storehouse, a winter room, and a summer room. In the courtyard are a kitchen and a stable for cattle. The use of corrugated-iron roofing for the more important buildings in the country has been extending rapidly within recent years, and at Quetta corrugated iron is now one of the chief articles of trade, large quantities being imported from England every year.

IMPROVED STANDARDS OF LIVING—MINERAL WEALTH.

Although standards of living in this country are still low as regards most of the population, there has been much improvement in recent years. Tea is now in general use; sandals have given place to leather boots and shoes; warmer clothing, especially in winter, has replaced the light cotton garments formerly in vogue; and ornaments are more largely worn by women. A fair number of imported lamps and lanterns, metal pots, buckets, and cooking utensils are now used. An ordinary poor inhabitant of the country spends in summer about \$0.50 on a cotton turban and \$0.32 each on a shirt, trousers, shoes, and sheet. In winter he adds a felt overcoat costing about \$1, and sometimes a waistcoat at \$0.65. His wife's dress, consisting of a wrapper, a white shirt or chemise, wide drawers, and shoes, costs about \$1.20.

Coal is the only mineral produced in large quantities in Baluchistan—total production in 1911, 45,718 tons and 4,508 tons of coal dust. Patent fuel is made from the coal dust. The most important coal mines are owned by the Northwestern Railway Co., and the fuel is used on its locomotives in Baluchistan. The coal mines employ about 900 laborers. The mineral next in importance is chromite, there being 67 surface and 13 underground workings. The production in 1911 was 3,804 tons. The last report of the Public Works Department for Baluchistan (1911–12) states that the outlook for the development of the mining industry is on the whole encouraging; that there are large quantities of a fair grade of coal available, but as the local consumption is at present small, a foreign market for the fuel is needed. As regards chromite, large quantities of high-grade ore are available in the Zhob district, in British territory, but owing to the high cost of transportation and the low price in Europe profits are small. There are evidences of petroleum in many parts of the country, and there have been borings which have struck oil, but as yet without success commercially.

LACK OF IMPORTANT INDUSTRIAL UNDERTAKINGS.

Conditions in Baluchistan are, for the most part, still too primitive to admit of the organization of industries on commercial lines. However, since the British occupation of the northern part of the country there have been opened four steam flour mills, two ice factories, and a steam press for chopped straw, wool, and oil. A brewery is in operation near Quetta with an output of about 350,000 gallons per year. Among minor industries may be mentioned tanning, the manufacture of carbonate of soda, mat and basket making, and indigenous methods of dyeing.

A good soft leather is produced by immersing the hides in lime and carbonate of soda and tanning them with tamarisk. The manufacture of carbonate of soda, chiefly from saltworts (a kind of kelp or seaweed) is increasing. The saltworts are cut and after being partially dried are set on fire. Matting and raw materials for mat making are exported from Baluchistan in fairly large amounts.

The people are well versed in the manufacture of natural dyes from lac, willow, olive leaves, madder, etc. Pomegranate husks, alunogen or hair salt, and lime are used as mordants. In Quetta rose water and attar of roses are manufactured from the common Persian rose. Experiments recently made in sericulture have proved successful, and Quetta silk has been pronounced of the best quality. Measures are now being taken to develop the industry.

FISHERIES—FOREIGN WARES ON SALE.

Baluchistan has a coast line on the Arabian Sea of about 472 miles, its two native States, Khelat and Las Bela, facing this sea. Owing to scanty rainfall and the salty nature of the soil, the shore is almost entirely desert, and a short distance inland are many salt-water swamps. The chief ports on the coast are Miani, Pasni, and Gwadar. They are much exposed, and, owing to the shallowness of the water, large ships can not approach nearer than 2 or 3 miles. The coast swarms with fish and mollusks, and sea birds are numerous. The fishing industry along the coast affords considerable income to the native State of Khelat, as one-tenth of the fresh fish is taken as duty. Fish are caught both with nets and with hook and line. Large shoals of catfish appear off the coast toward the end of the cold weather, when they are caught; the air bladders are extracted and are eventually sent to England for manufacturing isinglass. The fish are salted and eaten by the people and also are largely exported to Bombay and Zanzibar. Sharks are prized especially for their fins, which bring as much as 32 cents per pound. Fresh sardines are so plentiful that they not infrequently sell 40 for about one-half cent.

There are comparatively few articles of American manufacture sold in Baluchistan. At Quetta American motor cars of the cheaper types are popular with British Army and civil officers. The surrounding roads here are good and suitable for motoring. In the native State of Khelat the roads are not suitable, and I am told that not even the khan of that State possesses a motor car. American hurricane lanterns have a good sale throughout the country and over the Persian and Afghanistan frontiers. Even poor nomadic tribesmen like to have these lanterns. Considerable American kerosene

is sold in the country. A few simple articles of American hardware, especially locks, are noticeable in the bazaars. Generally speaking, articles must be very cheap to have a sale in Baluchistan. Cotton piece goods are the most important articles of foreign merchandise, especially white long cloth, but the trade has been practically confined to India, England, and Germany.

AMERICAN FRUIT BOXES AND IRRIGATION SUPPLIES.

For Baluchistan's rapidly developing fruit industry American boxes might sell here, owing to the local scarcity of suitable timber. These boxes are now imported from Scotland. Also, American fruit evaporators, for the dried-fruit industry, might be introduced.

In connection with the efforts of the British authorities to extend the water supplies for irrigation purposes American boring implements and pipes for artesian wells, pumps, engines, etc., might be sold here. The agent for the Governor General at Quetta and also the Commanding Royal Engineer of the Military Works Services mentioned to me that they would be glad to receive catalogues and other information from the United States relating to improved implements for irrigation.

FRENCH AND PORTUGUESE INDIA.

PONDICHERRY.

While pursuing commercial investigations in southern India during the month of May, 1913, I visited Pondicherry, capital of the French possessions in India. This city, located on a flat, sandy stretch of the Coromandel Coast, about 150 miles south of Madras, from which it can be reached by one night's railway journey as well as by sea communication, has a population of about 50,000, but is the seat of government of an adjacent district of 113 square miles with a total population of 184,000, and also of other smaller French colonies in India, including Karikal, with an area of 43 square miles and 56,600 population; Chandernagore, with 3 square miles and 25,300 population; and Mahe, with an area of 5 square miles and 10,600 population. The government at Pondicherry also has jurisdiction over loges (habitations) at Surat, Patna, Kasimbazar, Dacca, Balasore, Masulipatam, and Calicut, all in India. Pondicherry has a historic interest which outrivals its present commercial and industrial importance. By treaty arrangement with Great Britain no French troops are maintained at Pondicherry, except about 150 for policing purposes. Of this number about one-third consists of a band, which in picturesque uniform, plays twice a week on the public square.

FEATURES OF CAPITAL CITY.

The city of Pondicherry extends along the seacoast about $1\frac{1}{4}$ miles and is about three-quarters of a mile in breadth. The town, which is regularly built, although containing many old houses, is divided into two parts, separated by a canal parallel to the sea, including the white town, which includes chiefly about 1,000 French people, a few English merchants, and about 2,000 people of mixed descent; and the black town, composed of the native Tamil population. The chief means of personal transport about the city is a curious-looking, clumsy vehicle known as the "pousse-pousse," which is a sort of double perambulator with four wheels and a hood, and which is pushed from behind by one or two coolies, while it is steered with a lever by a person seated in front (see Fig. 20, facing p. 479). It is difficult, except after much practice, to guide this vehicle without upsetting it or having a collision. A few rickshaws imported from Colombo are also in use, and I understand that about a dozen motor cars are possessed by a few of the wealthier people. As regards personal transport in Pondicherry and vicinity, I understand that the most significant recent development has been the increasing use of cheap bicycles by the native population. All goods traffic in Pondicherry is conveyed by means of bullock carts. The city is connected by a small branch railway line with the main line of the South Indian Railway Co., running between Madras and Tuticorin, at the extreme south of the Indian Peninsula.

IMPORTANCE OF GROUNDNUT TRADE.

The present commercial importance of Pondicherry is based almost entirely upon the groundnut industry, in which a heavy export business, chiefly to Marseille, has developed within recent years. These groundnuts closely resemble in appearance, and slightly in taste, American peanuts, and are crushed at Marseille. The ground-nuts are known in Pondicherry as "arachides," and the largest amount is exported as "arachides décortiquées" (shelled groundnuts), and a much smaller amount as "arachides en cosses" (groundnuts in the husk). The exports of shelled groundnuts from Pondicherry in 1912 amounted to 1,062,203 bags, each bag containing about 166 pounds. As showing how rapidly this business has developed, in 1911 the exports of shelled groundnuts were 1,041,696 bags, and in 1880 only 238,780 bags. The exports of groundnuts in the husk amounted to 164,414 bags in 1912. Two years previous, in 1910, the similar exports amounted to just about half as much, or 82,680 bags.

Throughout British India the groundnut industry is making rapid headway, but it seems to have owed all its origin to this French colony, which apparently began growing the groundnut on a large commercial scale at the suggestion of soap manufacturers in Marseille. At first Pondicherry was practically the only port in India exporting groundnuts, but now there is considerable rivalry in their export, with Madras, Bombay, Cuddalore, Porto Novo, and Negapatam. A great deal of the product now shipped from Pondicherry is grown outside of the French territorial jurisdiction. Altogether it is estimated that the Pondicherry-Madras area devoted to groundnuts covers about 500,000 acres and the Bombay area about 94,000 acres. The city of Madras is still exporting only about one-third as many groundnuts as Pondicherry (297,704 bags in 1912), but the port of Cuddalore is now a close rival, exporting 862,686 bags in 1912, which was almost double the exports of the previous year.

Out of the total exports of shelled groundnuts from Pondicherry in 1912, amounting to 1,062,203 bags, Marseille took 861,330 bags; Trieste, Austria, 73,727 bags; Antwerp, Belgium, 43,847 bags; while most of the remainder went to Dunkirk, France, and Hamburg, Germany.

The prices for groundnuts are relatively higher when exported shelled than when in the husk. Most of the shelling machines in use in the Pondicherry district by native farmers are Indian made, costing about \$120 and rather crude, though they seem to answer the purpose fairly well. Several of the leading export firms in Pondicherry which buy nuts in the husk, shell them with their own machinery, which are of French types, and do the work much more efficiently than the Indian-made machines. It would seem as if American nut-shelling machines could be used to advantage in connection with this groundnut industry, but no American machines seem to have been heard of in this district. The ordinary type of machine in use at Pondicherry turns out about 48 bags a day of shelled nuts. The refuse husks are sold locally for fertilizers for about 3 cents per bag.

OTHER EXPORTS—REVICTUALING.

While the bulk of Pondicherry's export trade is in groundnuts, there are also a few exports, chiefly to France and to Indian ports, of areca nuts, castor oil, chillies, clarified butter, coconut oil, coffee, coriander seeds, cotton cloth, dried fish, guinees (blue cloth), hides, indigo, oil cakes, rice, saffron, sesame, sesame oil, tamarind, and thread cotton. The only important local industry in Pondicherry city, aside from milling groundnuts and baling them for export, is manufacturing cotton cloth, chiefly of a blue sort exported to the Straits Settlements and Indian ports. There are four of these cotton mills in Pondicherry.

Pondicherry has a special importance with regard to its import liquor trade, for it is a free port, hence there is always a demand for wines, spirits, etc., as most of the passenger steamers replenish their stocks for consumption on board from the wholesale merchants here. The facilities for obtaining these are greater than in British ports and prices are lower. In addition to large imports of brandy, gin, whisky, champagne, rum, beer, and vermouth, other chief imports include cotton, kerosene oil, gunny bags, olive oil, paper, shirtings, soap, perfumes, paints, dyes, sugar, bicycles, and pulses and grains. The total imports now amount to about \$1,175,000 per year.

LIMITED TRADE WITH UNITED STATES.

There is apparently no trade between Pondicherry and the United States, except in kerosene oil, and occasionally a few orders for American beer and rum. An American firm obtained a concession from the French Government a few years ago for supplying Pondicherry with kerosene oil and then built some large iron tanks for storing it, each holding several thousands of tons, with which to supply the market in the interior. This company exported from the United States into Pondicherry during the calendar year 1912, 30,000 cases of kerosene oil, valued at \$27,163. It would seem as if American manufacturers might do a certain amount of business in Pondicherry in nut-shelling machinery, plows, pumps, bicycles, and a few other specialties, but no great amount of sales could be expected in view of the limited population, poverty of most of the natives, and their reluctance to take up with modern improved implements.

Irrigation is necessary to agriculture in most parts of this French colony, but the water is pumped over the land in a most primitive manner. While walking over the botanical gardens at Pondicherry, I observed three men slowly drawing water into an irrigating ditch out of a well, over which was a high suspending ladder, from the top end of which was a rope which lowered and raised the bucket. Two of the men walking up the ladder would balance it, so that the upper end would come down and let the bucket into the water, and they would then walk down the ladder so that it would lift the bucket with water. The third man would manipulate the bucket with a stick so that it would fill with water when reaching the water level and then would pour it into the ditch when it came up.

PUBLIC WORKS AND HOTELS—THE BAZAARS.

A British firm has a contract for lighting Pondicherry with electricity. There are few public-work developments, although several years ago there was a 300-foot extension of the pier, and pipes were laid to bring in water from a natural spring about 3 miles away. The health of the city is good and there seem to be no epidemics. There are three hotels in this city, none first class, and also a travelers' bungalow near the railway station, where a traveler may reside for three days free of charge, but must make his own arrangements with the servants regarding food. In the native town the bazaars are rather cheap, and in the European part of the city there are only two shops which do considerable business in imported goods. As regards such outward evidences of trade the city seems to suffer by comparison with its position in the middle of the seventeenth century when it was the finest city in India. The mercantile trade of Pondicherry is, however, controlled now at Madras, and it is in that city that the people of Pondicherry purchase most of the better class articles which can not be bought at home.

STEAMSHIP LINES.

The usual steamship lines calling here are the British India, Messageries Maritimes, Clan, and Asiatic, besides others that are chartered for the groundnut trade. Freights are usually low. The trade carried on by native craft is now quite extinct, as the steamship lines and railway carry the goods cheaper and quicker. While Pondicherry itself is a free port, goods transshipped from here into British India must pay customary Indian duties.

COMMERCIAL INTERESTS AND LOCAL GOVERNMENT.

Pondicherry has a chamber of commerce, which looks after its commercial interests, especially in connection with the groundnut trade. The secretary is M. Jules Delaselle (Secretaire adjoint de la Chambre de Commerce). There is also a consul representing the British Government here (Lieut. Col. A. de C. Rennick). To both of these I am indebted for much of the information contained in the foregoing report. Pondicherry is also a seat of a Catholic archbishop, and is the headquarters of the French Roman Catholic missions in India.

There is an English as well as a French post office in Pondicherry, the English Government having retained the right to have its own post office here when it ceded back the place to France in 1817. The supreme executive power at Pondicherry rests with the Governor General appointed at Paris, who is assisted by a council, including the Director of the Interior, the Treasurer, the Procureur General, the Chief of the Marine, and the Engineer of Public Works. There is also a local council general composed of 30 persons, one-third chosen by French voters and two-thirds by other residents of the colony. This body elects one member of the French Senate at Paris. Also, by a general manhood suffrage, there is elected one member of the French Chamber of Deputies. There are about 300 schools in

Pondicherry and tributary districts with 16,000 pupils. About 500 vessels a year visit this port, with tonnage of about 460,000 tons. The sea trade amounts to about \$2,600,000 per year.

PORtUGUESE INDIA—GOA.

The Portuguese possessions in India consist of the Province of Goa, situated within the limits of the Bombay Presidency, on the Arabian Sea coast; the small territory of Daman on the Gujarat coast, at the entrance to the Gulf of Cambay; and the little island of Diu, lying off the southern extremity of the Kathiawar Peninsula.

Goa forms a compact block of territory surrounded by British districts. Savantwadi State lies to the north of it, the Arabian Sea on the west and North Kanara on the south, and the eastern boundary is the range of the Western Ghats, which separates it from the British districts of Belgaum and North Kanara. The extreme length from north to south is 62 miles and the greatest breadth from east to west 40 miles. The territory has a total area of 1,301 square miles. The whole country is hilly, especially the western portion, the predominating physical feature being the Western Ghats, which besides bounding the country along the northeast and southeast, jut off westward and spread across the country in a succession of spurs and ridges. There are several conspicuous isolated peaks, of which the highest, Sonsagar, is 3,827 feet high.

The country is intersected by numerous rivers running westward from the Ghats, and the principal eight, which are all navigable, are in size of some importance. Goa possesses a fine harbor, formed by the promontories of Bardez and Salsette. Halfway between these extremities lies the cabo, or cape, which forms the extremity of the island of Goa. This divides the whole bay into two anchorages, known as Aguada and Marmagao. Both are capable of accommodating the largest shipping from September to May, but Aguada is virtually closed during the southwest monsoon, owing to the high winds and sea and to the formation of sand bars across the estuary of the Mandavi River, which opens into Aguada. Marmagao is accessible at all times and is therefore the harbor of commercial importance. It is the terminus of the railway running to the coast from the inland British system of lines. A breakwater and port have been built there and the trade is considerable, being chiefly transit trade from British territory. The total population in the whole Goa territory is about 475,513.

One-third of the entire territory of Goa is under cultivation. The staple produce of the country is rice, of which there are two good harvests, but the quantity produced is barely sufficient to meet the needs of the population for two-thirds of the year. Next to rice, the culture of coconut palms is deemed most important, from the variety of uses to which the products are applied. Hilly places and inferior soils are set apart for the cultivation of cereals, and several kinds of fruits and vegetables are cultivated to an important extent.

In the days of its glory, Goa was the chief entrepôt of commerce between the East and West and was specially famous for its trade in horses with the Persian Gulf. It lost its commercial importance with the downfall of the Portuguese Empire and its trade is now insignificant. Few manufacturing industries exist, and most manufactured

articles in use are imported. Exports chiefly consist of coconuts, betel nuts, mangoes and other fruits, and raw produce. A railway connects Marmagao with the Madras & Southern Mahratta Railway. Its length from Marmagao to Castle Rock, above the Ghats, where it joins the British system, is 51 miles, of which 49 are in Portuguese territory. The railway is under the management of the Madras & Southern Mahratta Railway administration, and the bulk of the trade of Marmagao port is what it brings down from and takes to the interior. The telegraphs in Goa territory are worked as part of the system of British India, and are maintained jointly by the British and Portuguese Governments. The Goa territory was formerly subject to devastating famines and the people suffer heavy losses in times of drought. They are then supplied, though at great cost, with rice from British territory.

Nova Goa, the present capital of Portuguese India, includes Panjim and Ribandar, as well as the old city of Goa, and is 6 miles in extent. Old Goa is some 5 miles distant from the new city. Panjim occupies a narrow strip of land leading up to the Cabo, the cape dividing the Aguada Bay from that of Marmagao, and mainly slopes down to the edge of the Aguada. It was selected as the residence of the Portuguese viceroy in 1759, and in 1843 it was raised to its present rank as the capital of Portuguese India. The appearance of the city, with its row of public buildings and elegant private residences, as seen from the water, is very picturesque.

Goa is regarded as an integral portion of the Portuguese Empire and, with Daman and Diu, forms for administrative purposes one Province subject to a governor general, who is appointed directly by the Lisbon Government and holds office for five years. Besides his civil functions, he is invested with supreme military authority in the Province.

Most of the supplies obtained for Portuguese India are purchased in Bombay. The chief American article used there is kerosene, of which the imports amount to about \$80,000 per year. Travelers wishing to visit Goa can reach it most easily from Bombay, either by railroad or steamer.

Since the outbreak of the war, Goa has attracted considerable attention, on account of the number of German and Austrian ships which sought refuge there, this being the only neutral port between Massowah in Italian Abyssinia, and Manila in the Philippines, or Batavia in Java.

THE ANDAMAN ISLANDS.

[By Consul Charles K. Moser, Colombo, Ceylon.]

The following account of the Andaman Islands by Mr. F. M. Mackwood, who recently returned to Ceylon from a visit there, may be of passing interest to persons interested in the trade among the islands about the Bay of Bengal.

Port Blair, the principal port and center of activities in the islands, is one of the prettiest places in the world. There is a large bay running into numerous creeks, and looking from the top of Mount Harriett—1,200 feet high and a superb natural sanitarium—the harbor and creeks appear like the Lakes of Killarney.

Port Blair is unique in the British Empire for any tourist going to make a stay there. He must first obtain a permit to land, and next get his rations, servants, and conveyances to go about, from the Supply and Transport Department of Government. Consequently, anyone going there must stay with friends. Except a few bazaar people, there are no free laborers in the Andaman Islands. The convicts are 12,000 in number, and there are about 4,000 self-supporters, who are time-expired convicts, settled in the island with their families. These are mostly small farming squatters who also draw their rations from the Government. In return these squatters offer their crops to the Government for sale in the first instance.

The wealth of the Andaman Islands, whose area is about 2,600 square miles, lies in its forests; and their chief forest tree is the Padauk, a very valuable wood. During the last 20 years a fair amount of land around Port Blair has been planted in coconuts, Liberian coffee, and rubber, but in the absence of proper agricultural knowledge concerning these products the results are very poor and depressing to look at, especially to one who has seen them properly grown. A small quantity of the rubber 8 years old is as good as any to be seen elsewhere, but the rest has been planted in unsuitable ground, which appears to have been previously cropped once or twice with other products and with disastrous results. Liberian coffee gives two crops a year, grown under shade; but no pruning or draining has been attempted, and a greater part of the area is dying out, partly due to the absence of shade.

Coconuts have been planted in many instances in very unsuitable places. Some are in tidal swamps, and probably half the acreage can be written off as useless. The soil of the islands is good, and if properly planted and worked, these three crops should be a mine of wealth. Labor is the great drawback. During the last two years the number of convicts sent to the Andaman Islands has been much less than in previous years. Roughly speaking, there are about 12,000, including those serving their earlier sentences; 8,000 are needed for the settlement work, leaving only 4,000 available for forest and agricultural development, etc. With more convicts coming down and employed on these profitable works, there seems no reason why the Andaman convict establishment should not be self-supporting. The soil is good, and in the middle Andaman Islands it is said to be superior. All the islands are practically a mass of forests, in which there is a great scarcity of mammal life. Strange to say, there are in the Andamans no types of leopard or bear, no mongoose, monkey, or jackal.

EFFECT OF WAR ON TRADE CONDITIONS.

DECIDED FALLING OFF IN TRADE DURING 1914.

[By Consul General James A. Smith, Calcutta, Mar. 5, 1915.]

The calendar year 1914 witnessed a decided falling off in the sea-borne trade of British India. Although the first seven months of the year showed some decline in the trade, the marked decrease during the last five months was mainly responsible for the poor showing made. Primarily the decrease can be attributed to the closing of certain markets, especially Germany, which is, after the United Kingdom, India's best customer both in the export and import trade, the curtailment of the trade with France and Belgium, restriction of trade with neutral countries, scarcity of tonnage, and the dislocation of the world's exchanges.

TOTAL VALUE OF SEA-BORNE TRADE.

In round figures the value of the total sea-borne trade in 1914, including treasure and reexports, was \$1,296,936,000, as against \$1,538,626,000 the previous year. Imports, excluding treasure, were valued at approximately \$507,947,000, in comparison with \$584,465,000 the previous year, while exports, including some \$14,986,000 worth of reexports but excluding treasure, reached a total of \$688,358,000, as against \$797,116,000 during 1913. The value of the trade in treasure, both import and export, was about \$102,000,000.

The following table shows the total value of the sea-borne trade of British India, including treasure and reexports, for the past 10 years:

Years.	Value.	Years.	Value.
1905.....	\$931,068,000	1910.....	\$1,232,655,000
1906.....	1,013,813,000	1911.....	1,355,001,000
1907.....	1,124,964,000	1912.....	1,504,893,000
1908.....	1,003,277,000	1913.....	1,538,626,000
1909.....	1,041,862,000	1914.....	1,296,936,000

As shown by the following table, giving the import and export trade for each month, there was a decided decrease in the trade during the last five months (the war period) of last year compared with the preceding months of the year and compared with the last five months of 1913. The import figures do not include treasure, nor do the export figures include treasure and reexports. The reexports amounted in value to \$14,985,740 in 1914, compared with \$14,861,999 for 1913.

Months.	Imports.		Exports.	
	1913	1914	1913	1914
January.....	\$54,505,330	\$58,526,684	\$71,755,871	\$71,288,095
February.....	42,205,519	43,691,359	75,489,070	80,508,587
March.....	45,620,795	50,165,527	69,038,130	74,506,563
April.....	48,799,812	47,031,058	68,234,048	66,220,635
May.....	46,411,475	44,089,488	62,598,773	68,274,040
June.....	39,659,980	41,144,501	56,903,454	69,512,478
July.....	46,965,399	45,430,471	65,721,961	62,112,838
August.....	52,332,487	41,937,151	55,935,235	31,238,506
September.....	54,024,165	24,003,559	63,192,471	24,541,487
October.....	53,714,977	40,108,138	70,349,646	32,393,740
November.....	53,402,303	38,728,877	61,774,952	51,255,634
December.....	46,823,210	33,089,825	61,260,266	41,522,344
Total.....	584,465,452	507,946,636	782,253,877	673,372,747

FLUCTUATION IN PRINCIPAL ARTICLES OF IMPORT.

The imports of gold into British India during last year decreased by \$55,789,673 compared with 1913. Another large decrease was in colored cotton piece goods amounting to \$15,986,394, gray (unbleached) goods to \$8,095,690; and white piece goods to \$5,396,880. The principal increases were in railway carriages and wagons, railway locomotives, and kerosene oil. The following table shows the value of the principal articles of import into British India in 1913 and 1914:

Articles.	1913	1914	Articles.	1913	1914
INCREASES.					
Railway carriages and wagons.....	\$13,287,871	\$16,841,866	Woolen piece goods.....	\$8,203,479	\$4,788,646
Locomotive engines, etc. (railway).....	4,937,522	8,043,015	Silk piece goods.....	6,762,693	4,747,237
Kerosene.....	8,774,290	11,006,524	Precious stones and pearls (unset).....	3,632,891	321,875
DECREASES.			Hardware.....	12,656,706	10,137,727
Sugar, 16 D. S. and above. Cotton piece goods:	44,367,345	34,698,982	Glass and glassware.....	6,474,732	4,033,865
Gray (unbleached)....	84,157,056	76,061,366	Sheets and plates (iron or steel).....	23,203,720	20,793,766
White.....	46,167,522	40,770,642	Gold.....	108,690,372	62,900,699
Colored.....	57,820,992	41,843,598			

CHANGES IN PRINCIPAL ARTICLES OF EXPORT.

There was a decrease of over \$40,000,000 in the exports of raw jute during last year compared with 1913, nearly \$22,000,000 in the shipments of wheat, over \$20,000,000 in rice, \$7,650,000 in opium, \$7,260,000 in cotton twist and yarn, and \$6,520,000 in jute cloth. The exports of raw cotton increased in value by over \$18,000,000 and cotton seed by over \$2,400,000. In the following table are given the values of the principal articles exported from British India during 1914, compared with 1913.

Articles.	1913	1914	Articles.	1913	1914
INCREASES.					
Indigo.....	\$783,740	\$1,404,482	Cotton, twist and yarn.....	\$31,657,585	\$24,397,168
Tea, black.....	47,344,543	48,545,216	Cotton piece goods.....	6,780,202	5,368,080
Coffee.....	3,893,404	6,736,414	Hides, raw.....	25,936,771	23,277,725
Spices, pepper.....	953,021	1,482,292	Skins, raw.....	11,030,866	9,373,375
Cotton seed.....	5,313,079	7,751,634	Manganese ore.....	4,194,295	2,932,825
Groundnuts.....	13,075,096	14,968,293	Seeds:		
Cotton, raw.....	121,641,817	139,732,126	Castor.....	6,299,529	4,587,260
Hides, tanned, etc.....	5,681,088	6,437,202	Linseed.....	18,382,861	18,768,845
Paraffin wax.....	1,955,637	2,602,312	Rape.....	12,500,588	9,078,716
Gumny bags.....	39,154,457	40,324,695	Jute:		
			Raw.....	97,591,341	56,671,551
			Gunny cloth.....	51,210,501	44,600,262
DECREASES.					
Barley.....	5,837,065	763,174	Coir, manufactures of.....	2,896,852	1,901,269
Grain.....	2,431,649	880,238	Oil cakes.....	4,519,981	3,809,803
Pulse.....	3,703,913	2,930,003	Coal.....	2,408,538	1,652,738
Rice.....	92,260,450	71,784,986	Bones (manure).....	2,657,464	1,899,604
Wheat.....	47,941,522	25,992,692	Fodder: Bran and pollard.....	2,694,995	1,928,716
Oatum.....	13,563,417	6,905,376	Silver.....	7,411,514	2,836,668
			Gold.....	15,878,577	9,971,663

TRADE SITUATION STAGNANT.

[Apr. 6, 1915.]

During the months of January and February, 1915, both the imports and the exports of India continued to decline, the falling off in the former amounting to \$40,681,691 and in the latter to \$67,510,365 from the corresponding period of the previous year.

The present trade situation in India may be summarized in the one word "stagnant." All commercial relations with enemy countries have, of course, ceased. The central and provincial governments have, from motives of economy, held up for the time being many contracts for public works already projected, thus unfavorably affecting imports of material. The export trade is adversely affected by embargoes or restrictions placed upon certain articles, but a far better showing in this trade could doubtless be made if tonnage were available. Because of this shortage freight rates are exorbitantly high, and there has been in consequence a considerable rise in the price of commodities.

Shippers inform this office that a considerable demand exists in the United States for jute and jute manufactures, the principal articles of export from here, but they are unable to fulfill contracts for the time being owing to lack of transportation. In some cases ships, which had been partially loaded with export goods, have been requisitioned at the last moment and the cargo discharged on the docks to wait for a later steamer, thereby causing serious loss to shippers. The value of exports to the United States fell off fully \$5,000,000 during the quarter ended March 31, 1915, as compared with the corresponding quarter of the previous year.

THE WAR AND OUR TRADE WITH INDIA.

[By Consul José de Olivares, Madras, Sept. 15, 1914.]

The complete stoppage, due to the present European war, of the extensive import and export trade between South India on the one hand and Germany and Austria on the other, coupled with existing export prohibitions on the part of all countries at war, has resulted in creating an opportunity for largely increased trade between this

country and the United States. The only obstacle presented is the insufficiency of shipping facilities, which, on this side of the world, are almost entirely wanting. The measure wherein the United States may hope to profit by existing trade opportunities therefore will depend largely upon its preparedness in regard to shipping.

STOPPAGE OF SHIPPING.

The first seven months of 1914 witnessed a general expansion in practically all staple lines of imports from and exports to the United States, and the prospects for a record year were never brighter. Then came the outbreak of hostilities, accompanied by an abrupt check to commerce and business in general, involving the immediate cessation of all exports and subsequently of imports upon the arrival of vessels at the time en route to this country. This was caused by the stoppage of shipping due to uncertainty regarding the safety of merchant vessels on the high seas, the imposing of prohibitive war-insurance rates, and the requisitioning of many vessels for use in connection with the war.

CONTRABAND.

The export trade was further obstructed by the issuance of a Government order prohibiting the taking of the following commodities by sea or land out of British India: Bullocks, camels, horses, pig lead, medical and surgical stores and equipment of every description, mules, slaughter cattle, sheep and goats, veterinary instruments and appliances, and veterinary medicines. The resumption of export trade in these articles will depend upon the duration of the war.

IMPROVED PROSPECTS.

As regards imports, however, strong hopes are entertained for earlier relief of the situation. These hopes are based upon the belief that trade routes will be kept open and adequately protected, which prospect has already accomplished the important result of reducing the abnormal insurance rates, and the indications are that merchant vessels temporarily used by the British Government will be restored in the near future to commerce. The nonparticipation of German vessels in the British Indian trade will constitute a deficiency in carrying facilities for which a remedy must be provided.

The new law admitting foreign-built vessels to the American registry is regarded as an additional basis for confidence in the early restoration of trade between the United States and India. The need of American imports in South India is greater now than ever before, due to the existing prohibition from exportation of many staples, particularly foodstuffs, from all the countries now at war.

Among articles to be treated as conditional contraband, under the royal proclamation published by the Madras Government September 13, 1914, were the following: Foodstuffs, clothing, and vehicles suitable for use in war, money, vessels and boats, railway and telegraph material, fuel, barbed wire, horseshoes, field glasses, and nautical instruments.

RECENT TRADE OF MADRAS.

The value of the trade of the Madras Presidency during the last two years is shown by the following table, in which the nations named are ranked according to the value of the imports from each during the fiscal year ended March 31, 1914:

Countries.	Imports into Madras.		Exports from Madras.	
	1912-13	1913-14	1912-13	1913-14
British Empire.....	\$31,362,321	\$41,061,256	\$41,768,196	\$44,966,460
Germany.....	2,114,008	2,995,169	7,550,213	7,786,400
Belgium.....	1,474,225	2,090,648	3,857,188	3,761,156
France.....	1,369,109	1,562,471	12,754,772	13,908,781
United States.....	1,607,424	1,453,958	2,673,648	2,382,963
Austria-Hungary.....	957,727	887,325	1,586,155	1,415,827
Russia.....	30,821	2,271	292,314	510,009

It may be assumed that a large percentage of the trade with the British Empire, Belgium, France, and Russia which might at present, through force of circumstances, be diverted to the United States, would, for reasons of sentiment, eventually revert to those countries, but this may not be true of the trade formerly shared by Germany and Austria-Hungary.

AMERICAN GOODS WANTED.

The following list indicates American commodities for which an increased market is offered in South India:

Vehicles, hardware, and metals.—Motor cars; motor cycles; cycle cars; side cars; motor vehicle tires and accessories; bicycles and accessories; perambulators; gocarts; ironmongery; engineers' valves and brass foundering; small engineers' and carpenters' tools; locks; bolts; iron cooking utensils; enameled ware; hollow ware; aluminum ware; oil stoves; water filters; wire nails; barbed wire; galvanized woven wire; iron and steel tubes, pipes, and bars; continuous galvanized iron; zinc sheets, ingots, and boiler tiles; aluminum sheets, circles, bars, and ingots; iron and steel; cutlery; razors; pocket-knives; scissors; brass; copper; yellow metal (copper and spelter); fire clay; Portland cement.

Machinery, electrical supplies, lamps.—Woodworking machinery; lathes; saws; agricultural machinery; plows; drills; rice and grain mills; gasoline engines; well-boring plants; hand and power pumps; leather belting; cotton-mill machinery; rubber-working machinery; textile machinery; sewing and knitting machines; mining machinery; prospecting plants; railway equipment; locomotive engines, tenders, and parts; tramcar trucks; dynamos; electric pocket lamps; metal lamp ware; glass lamp chimneys and globes; incandescent lamp mantles.

Painters' materials, ceramics, etc.—White and red lead; white zinc, terra-cotta ornaments; crockery; plain and fancy table glassware.

Musical and scientific instruments.—Organs and harmoniums; accordions; harmonicas; talking machines; scientific instruments; thermometers; photographers' supplies.

Chemicals, toilet articles, toys.—Aniline dyes; synthetic indigo; drugs; surgical appliance; vacuum bottles; cheap dressing cases; combs; brushes; rubber goods; perfumery; children's tricycles; masks; paper garlands.

Leather goods, stationery, printer's goods.—Leather and fiber trunks and suit cases; albums; Christmas cards; fountain pens; pencils; desk articles; metal type; printing paper; cheap wrapping paper; waterproof packing paper; cardboard; twine.

Furniture, foods, and drinks.—Bent-wood furniture; perforated chair seats; linoleums; cheap framed pictures; moldings; canned fruits, vegetables, and meats; condensed milk; biscuits and cakes; dried fruits; breakfast foods; beer; spirits.

Textiles and millinery.—Cotton and woolen tweeds and flannels; cheap cotton dress fabrics; fancy table linen; Como silk rugs; cheap molleton blankets; shawls; cotton twist and yarn; gold and silver thread; lametta; fancy goods; fancy dress trimmings; fancy buttons; cheap buttons; cheap beads and bangles; haberdashery; knit cotton hosiery, underwear, and gloves; wash ties.

Miscellaneous.—Hot-air fans; cigar lighters; arms and ammunition; dynamite; cheap clocks, watches, and jewelry; shoes; umbrellas; ladies' work baskets; soap; fertilizers.

The foregoing list is based chiefly upon information supplied by leading importers in Madras who have been specially interviewed on the subject of the present opportunity for increasing the import trade in American commodities.

INDIAN GOODS OFFERED IN EXCHANGE.

The products for which South India seeks an increased American market are set forth in the following list: Tanned cow and buffalo hides; tanned and raw goat and sheep skins; hide fleshings; horns; bones; coconuts; coconut oil and oil cake; copra; groundnuts (peanuts); groundnut oil and oil cake; castor seed; sesame seed; lemon-grass oil; niger seeds; tea; coffee; pepper; ginger; cardamoms; indigo; myrobalans; turmeric; nux vomica; senna leaves; coir manufactures; fiber for brushes and brooms; rubber; jute; hardwood timber; sandal-wood; manganese ore; mica; woolen carpets; and rugs.

As regards tanned cow and buffalo hides, it appears that an enormous demand has arisen for these commodities on the part of England and its allies by reason of the war, and the prospects are that there will be no leather of this class available for export elsewhere than to the countries referred to so long as hostilities continue. The position with regard to raw and half-tanned skins, however, is altogether different, the demand therefor from England and Germany having now entirely ceased, leaving large stocks of these products to be disposed of.

The disposition of the groundnut crop is a serious problem, for the reason that this product will not keep for any considerable time. Unless shipping facilities are at once restored it will probably be necessary to press the seed, in which case a large portion of the previous export of seeds will be available only in the form of oil. Castor seed, being less perishable, will admit of being stored for a time, and hence there is more hope of eventually marketing the existing stocks. It is believed that when the present shipping difficulties are overcome

and Marseille—to which port a preponderance of the groundnut crop is exported—resumes crushing, the markets for the peanuts and castor seed will readjust themselves. In the case of coconut oil and copra, however, the outlook is not encouraging, and new outlets are felt to be imperative.

The total foreign trade of the Madras Presidency in 1913–14 represented the enormous value of \$141,461,571, but the share of the United States therein was entirely disproportionate to its rank among the trading nations of the world. The time has arrived for a redistribution of the foreign trade of this section among the countries participating therein, and the opportunity for the United States materially to increase its share could not be more favorable. It is the opportunity of a century, and there is abundant confidence on this side of the globe that it will be promptly embraced.

THE WAR AND OPPORTUNITIES IN INDIA.

[Nov. 13, 1914.]

The Indian Trade Journal, published by the Commercial Intelligence Department of the Government of India, has an article on India's engineering trade, especially as affected by present war conditions. It states that as regards articles of engineering interest, India now takes the first place among manganese-producing countries, and ore was exported in the fiscal year 1913–14 to the amount of 718,049 tons, of which Great Britain took 258,776 tons, Belgium 187,821 tons, the United States 106,327 tons, and France 103,847 tons. The exports of iron and steel reached 84,855 tons, a decrease of nearly 20,000 tons as compared with the preceding year. In this connection, it may be noted that the Tata Ironworks, near Calcutta, increased their production from 97,367 tons of pig iron in 1912 to 140,293 tons in 1913, in addition to 15,003 tons of steel rails and 16,044 tons of beams, channels, and bars, while the Bengal Iron-works contributed 59,379 tons to the production of the country.

THE WAR PROTECTS INDIAN INDUSTRIES.

To a certain extent the war will act by way of protection to the home industry of India. The Trade Journal notes that it is fortunate at this juncture that India has its own production of iron and steel. Again, if the jute and cotton mills can be kept at work the difficulties and risks attendant on a state of war will tend to make them get their needs for repairs and renewals met in India. The same may be said of stores for railways, steamers, electric undertakings, mines, and tea gardens.

IRON AND STEEL IMPORTS—PRINCIPAL COUNTRIES.

The imports of iron and steel and manufactures thereof other than for railways in 1913–14 amounted to 1,016,000 tons, having a value of about \$50,000,000 and representing an increase of 293,924 tons over the preceding year. The quantity sent from the United Kingdom increased by 177,073 tons to 607,146 tons, while Germany supplied 200,103 tons as compared with 120,144 tons in the preceding year. Belgium sent 173,048 tons in place of 120,461 tons, and the United States 22,028 tons in place of 36,469 tons. The first place is taken by

galvanized sheets, 274,759 tons of which out of a total of 277,595 tons, were supplied by Great Britain. But with iron and steel bars and channels, which take the second place with 231,355 tons, the rank of this country is different, for 108,028 tons came from Belgium, 85,310 tons from Germany, and only 33,817 tons from Great Britain. Germany was also ahead in sheets and plates not galvanized or tinned, for it sent 40,563 tons, as against Great Britain's 38,894 tons and Belgium's 19,319 tons. Of angle and spring steel Germany sent 14,299 tons, the share of Great Britain being 17,038 tons and of Belgium 12,316 tons; its contribution of nails and rivets was 5,338 tons, compared with 7,291 tons from Great Britain and 3,315 tons from Belgium. In pipes and fittings (cast) it had a comparatively unimportant share, sending only 4,101 tons, as against Great Britain's 42,583 tons; Belgium's contribution in this department was only 468 tons, but the United States sent 9,037 tons. In beams and pillars it was, however, a more important competitor, supplying 21,554 tons, as compared with 56,176 tons sent by Great Britain.

IMPORTS OF MACHINERY—ENGINES—ELECTRIC WIRING—MOTORS.

The value of the machinery and millwork imported into India during 1913–14 was about \$25,000,000, an increase of 43 per cent over the previous year's figures. The textile machinery accounted for about 42 per cent of the total, while the other two most important items, steam engines and their components and electrical machinery, were worth about \$3,300,000 and \$1,700,000, respectively. Of the total, Great Britain supplied over \$20,000,000 worth and Germany only about \$1,430,000, but figures showing the amounts contributed by the different countries under the various headings comprised under machinery and millwork are not yet available. It may be said, however, that German steam engines and boilers are practically unknown in India, apart from a few examples of Wolf engines which have been installed on account of their high efficiency; and while there are many Diesel engines of German manufacture, the British product commands the market so far as the ordinary gas and oil engine is concerned. Germany has perhaps the largest share in the supply of light railway material for collieries, including steel tubes. In recent years the Indian collieries have adopted electrical equipment to a considerable extent, and here German goods have found an opening. A very small amount of German machinery has found its way into the Mysore gold fields, where British makers have had to meet competition from America. The Calcutta market is flooded with cheap German materials for electric wiring, such as cables, switches, ceiling roses, and cut-outs, and although these are of the poorest quality, they are apparently satisfactory, as the demand continues. It is also stated that such of the flour mills in and around Calcutta as are electrically driven have German motors, transformers, and switch gear installed, and practically all the electrical plant in the Tata Ironworks is of German manufacture.

SEWING MACHINES—RAILWAY MATERIAL.

In the textile machinery market Germany has very little foothold. The United Kingdom supplied 90 per cent of the sewing machines, numbering 61,183, imported in 1913–14. Germany and the United

States contributed 6 and 3 per cent, respectively. Another important group of Indian imports is railway plant and rolling stock, the value in 1913-14 exceeding about \$45,000,000. The great bulk of the material comes from Great Britain. Germany last year contributed about \$1,000,000 worth of imports to this total, this being double Germany's share during the preceding year and about 13 times the value Germany contributed in 1909-10. Owing to the dissected figures for 1913-14 not being available as yet, it is impossible to say in what classes of railway material the Germans were most successful, but in the preceding year by far their largest contribution was in carriages and wagons and parts thereof, followed by steel or iron sleepers and keys, "other kinds of material," rails, chairs, and fishplates, and locomotive engines and tenders.

INDUSTRIAL OPPORTUNITIES—DYES—PERFUMES.

The Indian Textile Journal, published in Bombay, shows that the war offers certain rare opportunities for the greater utilization of certain economic products found in India. It is suggested, for instance, that gas tar, now used on some roads in India, might instead be converted into dyestuffs, while the waste product of local salt pans could be used for laying the dust on the roads. It is mentioned that another chemical industry that is capable of wide development in India is that of preparing perfumes from natural flowers. When the Indian methods, as published in official reports, are compared with those of France, Italy, Bulgaria, Germany, Australia, and Japan, the economic difference is so great that India's loss is evident in every process. The consumption of perfumes in India is enormous, but the organized manufacture of them is confined to a very limited number of small factories, some of which import a large proportion of the material they sell under their own labels.

PORLAND CEMENT—IRON WORKS—CUTLERY—MATCHES.

It is also stated that the manufacture of Portland cement has made a fair start in this country, and only requires to be kept up to the recognized standard in order to afford a sound investment to the public. The iron works of the Tata Co., in spite of the initial difficulties that surround such an enterprise in the Tropics, have been favored by unexpected circumstances, and are finding a steady market for their product. But these belong to enterprises under European direction, and only represent a small portion of the trade that India would like to secure. Concerning possibilities in the cutlery trade and in the match trade, the Textile Journal says:

If India desires to excel in the cutlery trade, her workmen must learn the business. Already many Indians are employed in the manufacture of knives, scissors, surgical instruments, and similar work, besides axes and agricultural cutting implements, but none of these things would pass for the product of Sheffield or Solingen. Under the title of small wares a great many articles with a textile basis are imported into India, many of which are made in very small factories. Gimp, fancy cords, tassels, upholsterers' trimmings, etc., furnish occupation for numerous families. The match trade has suffered a good deal in India because of the softening of the friction surface on the box during the rains. There are many waterproof cements and glues that would resist damp and overcome a defect that must certainly affect the demand for locally made matches.

OTHER OPPORTUNITIES FOR INDIAN MANUFACTURES.

The Textile Journal also states that Indian woods, as explained by bulletins of the Indian Forest Department, are entirely suitable for coach building, cabinetmaking, and many other uses. Commenting on the recent report of the Indian Merchants' Chamber in Bombay, which suggested local manufacture of aniline and alizarin dyes, glass, matches, sulphuric acid, industrial alcohol, oil, wheat flour, paper, and starch, the Textile Journal says:

Most of these manufactures are already in successful operation, and need no assistance. Sulphuric acid and other heavy chemicals are now to be had of high quality at a local factory. Glass is blown and molded at Talegaon, near Poona, Bombay Presidency. Bombay city possesses two paper factories. Sugar is made all over India, but needs organizing. Oils and wheat flour are largely produced, also matches. Starch and dyes still await a beginning, and industrial alcohol is in the hands of the Abkari Department, whose excise duties are at present too high. Scrap iron is produced in great quantities in India, and excepting the small quantity worked up by the railway, it is exported to China, Genoa, and elsewhere. The conversion of iron scrap into bolts, nuts, nail rods, and other small sections offers no difficulty either in first cost or operation, and the demand for these goods is very large, both in Bombay and the surrounding districts.

Among the important industries needing development, that of the potter was overlooked. The Indian potter is as much in need of help as was the handloom weaver. He has never learned to glaze a cooking pot or to get beyond brick clay as a working material. The cheap and useful domestic pottery that is imported from Japan shows the direction from which assistance of the best kind might be obtained.

GOVERNMENT AID TO BANKS AND COTTON TRADE.

[Jan. 9, 1915.]

Owing to the depression in the cotton trade, the Government of India has decided to supply funds to the leading banks so that they can give liberal assistance in financing trade during the present season. A conference was held at Delhi in November, 1914, between representatives of the Government of India and of leading cotton-producing and commercial interests to discuss the crisis in the cotton trade and to take measures to relieve the depression if possible. The Government of India, after considerable investigation of the matter, has now announced that it will advance up to about \$19,500,000 to Presidency banks on the security of Government paper. While such assistance is for the benefit of all trade, it is anticipated that it will benefit cotton interests in greatest measure.

CAUSES OF DEPRESSION—RESTRICTION OF COTTON AREA.

The Finance Department of the India Government has just issued a bulletin covering the situation, the substance of which is as follows:

The war has led to a serious decline in the demand for cotton, accompanied by a heavy fall in prices, and the Indian supply, which includes a considerable carry over from last season's crop, is thus likely to be much in excess of any immediate demand. It appears from the discussions of the conference held at Delhi toward the end of November, to consider the cotton situation, that the cultivators will probably be able to hold up the new produce for some time to come, but can not do so indefinitely. Trade has also been hampered by the withdrawal of the Marwari community from their usual active participation in its finance. Moreover, trade conditions were dull even before the outbreak of the war, owing to the banking crisis and the unfavorable monsoon of 1913; and in the case of cotton in particular, the depression due to the war has been intensified by the previously existing glut in the piece-goods market.

The conference at Delhi agreed that it would be in the interests of the cultivators and of the trade that the cotton area to be sown in 1915 should be considerably restricted

in favor of cereals. The Government of India entirely concurs in this view, and in abnormal circumstances it thinks it will be right for the local governments, through their agricultural and district officers, to give advice in this sense. Such advice should be given promptly, as the immediate assurance that the next crop will be on a much-reduced scale should encourage buyers to take up existing stocks. It is impossible at present to indicate what reduction of the area will eventually be required.

FINANCIAL REMEDIES.

As regards financial remedies, the conference considered two main alternatives. The first was that the Government guarantee direct Government purchase or the grant of advances on the basis of an artificial minimum value of cotton pledges with the Government or with the banks for the Government. Though such action was represented to the conference to have outside support, the weight of opinion in the conference itself was decisively against any such method of handling the problem. The prospects of ultimate success would evidently be most uncertain, and the commitments indefinite and dangerously large. Moreover, the Government of India could not render special assistance of this kind to one industry without extending similar aid to other products throughout India, and apart from other objections, such a policy would be quite beyond its present means.

The second and less ambitious alternative aimed at making good to some extent the curtailment of credit and the withdrawal of the financial facilities by which trade might otherwise be hampered. There are still uncleared loans on the old crops, and these funds and any further advances are likely, with a dull market, to be locked up for abnormal periods. It was urged that if banks are to advance freely on cotton in the present exceptional conditions, they must have some assurance of being able to get back their money when it is required, and that though this necessity can be met to a large extent by the grant of partial readvances on cotton by the Presidency banks, the latter, too, will require a similar contingent assurance of help from the Government should necessity arise. Provided that by such means the apprehension of an ultimate shortage of banking funds could be removed, it was thought that the financing of cotton will be materially facilitated and that trade activity will correspondingly revive. The procedure here suggested, of readvances by the Presidency banks to banks more directly concerned in financing cotton, and of loans, if necessary, from the Government to the Presidency banks, was generally indorsed by the conference. Since the same procedure is capable of application, when necessary, to other branches of trade, its adoption will avoid undue discrimination in favor of cotton interests, the inexpediency of which was emphasized by the practically unanimous views of provincial representatives. The arrangement under which Government intervention will be effected through the Presidency banks will also be in accordance with the past policy of the Government of India.

GOVERNMENT LOANS.

The Government of India has accordingly decided to act upon the lines above indicated, and to repeat, with necessary modifications, the announcement made in November, 1913, of its readiness to make loans to the Presidency banks to a moderate extent for the assistance of trade. The loans will be subject to the deposit of Government paper as security. Their duration will not exceed six months in the first instance, but they will be open to renewal, if this should seem desirable, to avoid the premature calling in of advances made by the Presidency banks themselves or by banks that the Presidency banks have assisted with funds. The rate of interest will be fixed with reference to the circumstances of time, but will not in any case be lower than 4 per cent, or 2 per cent below the current bank rate, whichever of these two amounts is greater. The present undertaking, like that of November, 1913, is only temporarily operative. The announcement now made is, therefore, without prejudice to the future permanent policy in regard to loans to the Presidency banks, the employment of paper currency reserve, and cognate matters, which will be considered in connection with the recommendations of the Royal Commission on Indian Currency and Finance.

NOTES ON NORTHWEST INDIA.

[By Consul James Oliver Laing, Karachi.]

INCREASED DEMAND FOR INDIGO.

One of the products of India that is enjoying a "boom" at present is natural indigo. The stoppage of the German synthetic product has increased the demand for it. The area under indigo in the Pun-

jab this year is 21,075 acres. This is 6 per cent less than was cultivated last year. The decrease is due to difficulty in getting irrigation water and also to a certain dissatisfaction with the crop which existed before the war. There has recently been a tendency to abandon this crop in the Punjab. The only important indigo districts in the Punjab now are Multan, Muzaffargarh, and Dora Ghazi Khan. In Bihar (Bengal) the acreage is 38,900, as compared with 63,100 last year. This decrease in output, together with the stoppage of entry of the continental synthetic product will probably keep prices high here for some time to come. There was an increased export of natural indigo from northwestern India to Afghanistan last year.

DATE SUGAR.

Another Indian industry which has seen evil days recently, but which will be revived temporarily at least, is date sugar production. The large import of cane sugar from Java and of beet sugar from the Continent caused date-sugar production to decline greatly, but the loss of the continental supplies and the manipulation of the Java crop have made a market for locally grown sugar. The local sugar interests are already noticing this movement, and date sugar will shortly be produced. The date trees have not been tapped for several years and should yield large results.

STATE RAILWAYS—COAL OUTPUT.

The approximate gross earnings of Indian state and guaranteed railways have decreased perceptibly since the beginning of the war. In a report just issued, covering the period from April 1, 1914, to October 17, 1914, the decrease was more than a crore of rupees (above \$3,000,000). The report does not discriminate between freight and passenger receipts, but there is no doubt that the stoppage of the movement of raw materials (jute, cotton, wheat, and seeds) is the chief cause for the discrepancy. The line showing the greatest falling off, as compared with a similar period last year, is the Great Indian Peninsula Railway, with a loss of 31 lakhs of rupees (more than \$1,000,000). The Eastern Bengal System lost 15 lakhs (about \$480,000); the North Western and Oudh and Rohilkhand Railways also 15 lakhs, and the Bombay Baroda line 13 lakhs (about \$420,000).

The inspector of mines for India reports that in 1913 the output of coal in the whole country was 15,486,318 tons. This is an increase of 10.27 per cent over the output of the previous year and is a record in quantity for India. At the same time the report shows a drop in the rate of increase, which was 0.83 per cent, 5.80 per cent, and 16.56 per cent for the three previous years, respectively. The drop in the rate of increase was caused in part by the flooding of mines in Bengal and Bihar. Abnormal floods were experienced there.

EFFECT OF WAR ON INDIAN TRADE.

[Bombay, Nov. 27, 1914.]

Many influences have been at work to reduce the volume of imports into Indian ports since the outbreak of war. The closing of markets on the cessation of commercial relations with the enemy countries; the curtailment of trade with France and Belgium, especially in oil-

seeds; the scarcity of tonnage; the restriction of the free movement of trading vessels; the restriction of trade with neutral nations—these are, perhaps, the important influences. The commerce, however, of the last few weeks is now, it seems, rapidly moving in the direction of normal conditions.

At Bombay some of the most striking features of the present situation are a sound retail trade, greatly encouraged by the movements of troops and their officers passing through here en route to the war or territorial forces coming here from England; steady prices for local foodstuffs, the tendency to exorbitant prices being checked by interference of the police; a substantial rise in prices of all imported foodstuffs; an exceptionally good business of Bombay hotels, owing to the influx of military people; a disorganization in cotton and allied trades, the closing of some cotton mills and the working of others with reduced staffs; a decrease in postal revenue.

GENERAL DISTURBED CONDITIONS.

Immediately on the outbreak of hostilities in Europe the different markets in Bombay became dislocated, and a feeling of uncertainty—bordering on panic—arose. The share market was disorganized and had to be closed; the cloth and yarn markets were disturbed. There was at first a difference of opinion as to the future of the Indian cloth market. It was anticipated that, owing to the outbreak of war, there would be a cessation of shipment of English piece goods, and that consequently there would be a demand for Indian cloth, followed by Indian trade boom. But the anticipations have not been realized, and the local yarn market is in a stagnant condition. There is not the slightest improvement in the demand, either locally or from China. The cloth market is dull and the sales are limited. Those dealers who had bought in advance have not been able to take deliveries. Owing to the excellent monsoon conditions and the consequent generous crops this year, the sales of cloth should have been considerable; but owing to the loss of credit and the heavy fall in rates of cotton there is a great deal of anxiety in the commercial community and sales have been very poor, no big orders being received from upcountry, in consequence of the expectation of a still further fall in the prices. The inquiry for yarn from China is limited, and there are no movements in the trade.

As soon as the war broke out a number of dealers in Bombay increased the prices of foodstuffs and most of the necessaries of life. It was feared that if the poor were compelled to pay the abnormal prices demanded by the dealers there would be looting of grain shops. However, an order was issued by the commissioner of police threatening prosecution of those who unduly raised prices; moreover, an advisory committee was formed for regulating prices. The prices fixed by this committee are published in the Government Gazette and the local newspapers from time to time, and are considered fair and satisfactory.

Owing to increase in freight and insurance rates, reasonable increases are allowed on imported provisions and foodstuffs. As the transports which left Bombay were locally furnished with supplies, there has been a big extra demand for beer, port, and provisions, such as biscuits, cheese, jam, jelly, and such other articles.

LIGHTER MAIIS.

One interesting influence of the war noticeable in Bombay is a marked decrease in the mails exchanged between India and Europe. This is due principally to a falling off in business correspondence; there are comparatively few communications being made between Indian and continental countries. The quantity of letters and newspapers received weekly in Bombay from Europe at this time last year averaged about 2,400 bags, but now it averages little more than 2,000. The outward letters and newspapers from Bombay to Europe averaged about 900 bags a week last year, while this year about 600 bags only are required. Similarly, the inward parcel mail has fallen from 27,500 bags weekly last year to 15,200 bags weekly this year, while the figures for the outward parcel mail are 10,700 bags last year and 5,900 bags this year. This position has brought about a slackening in activity at all the post offices throughout India, but in Bombay this decrease in work has been more than made up by the fact that the Bombay post office is the distributing center for all the mails for the troops from India at the war.

REDUCTION OF EXPENDITURES.

The Indian railways are seriously feeling the effects of the war, and are curtailing their service as much as possible without undue loss of efficiency, in order to reduce expenditures. Many of the fast express trains, such as between Bombay and Calcutta, will discontinue running after the 1st of December.

Different municipalities in India are also obliged to reduce expenditures on account of decreased revenues. In the Bombay municipal budget for 1915-16 there will be a reduction of expenditure amounting to about \$80,000, which will force postponement until a more propitious time of such improvements as increased lighting, increased mechanical transport, laying dust and extending the tarring of roads, and the execution of new works. The expenditure for primary education will also be slightly reduced.

LATEST CONSULAR TRADE REVIEWS.

CALCUTTA.

[By Consul General James A. Smith.]

Although the Calcutta consular district includes the Provinces of Bengal, Bihar and Orissa, Assam, the United Provinces, and the northern frontier Native States of Sikkim, Nepal, and Bhutan, with a total area of 441,797 square miles and a population of 146,588,088; this report is intended to deal more especially with the maritime trade of Bengal, as the other Provinces with their products for export and requirements as to imported goods depend largely, although not entirely, upon Bengal with its chief port, Calcutta, for their foreign trade. Calcutta is the second city in the British Empire in point of population. According to the census of British India for 1911, Calcutta proper, or the area administered by the Calcutta Municipal Corporation, with the port, fort, and canals, had 896,067 inhabitants; and, with the suburban municipalities of Cossipur-Chitpur, Manicktola, Garden Reach, and Howrah, an aggregate population of 1,222,313. The suburban municipalities differ from Calcutta only in respect to their municipal government. From a structural point of view they can not be distinguished, as there is nothing to show where one municipality begins and the other ends. The suburban water supply is drawn from the Calcutta mains. Howrah is separated from Calcutta proper only by the River Hoogly, and, like many suburban municipalities, is the dormitory of many people who earn their living in Calcutta proper; its industrial life being inseparable from that of the metropolis. The less important ports of Bengal are Chittagong, Narayanganj, Chandpur, Cox's Bazaar, Barisal, and Nilla.

CALCUTTA'S FOREIGN TRADE.

The sea-borne trade of Calcutta during the official year ended March 31, 1914, amounted to 95 per cent of the total trade of Bengal, both foreign and coasting, and 97 per cent of its foreign trade. Chittagong accounting for 3 per cent only of this branch of the sea-borne traffic. The combined traffic of Bengal, including Calcutta and the subordinate ports, advanced to an amount never before reached, the aggregate value being \$697,060,693. Imports of foreign merchandise were greater in every month of 1913-14 than in the preceding fiscal year, while the increased value of exports to foreign countries was principally due to higher prices and not to the increase in quantities of merchandise exported.

The foreign trade of the Province in 1913-14 amounted to \$600,974,459, or 8 per cent more than in the preceding year. The value of cotton goods imported was higher than in any previous year, and metals were received on an unprecedented scale. Imports of sugar, mineral oil, carriages and motor cars, hardware and cutlery,

liquors, provisions, glass and glassware, were the best on record. Exports of Indian merchandise to foreign countries increased 3 per cent, and enhanced prices increased the value of jute and tea shipments. Record values were also reached in exports of hides and skins, raw hemp, and fertilizers, but those of grain and pulse, due to unfavorable climatic conditions, declined.

The coasting trade was greater in volume, but lost 2 per cent in value, declining to \$96,086,234. Imports were improved by larger receipts of rice and mineral oil, but the export trade in grain and pulse fell off sharply. Imports, valued at \$49,814,303, increased 33 per cent; but exports, amounting to \$46,271,930 in value, showed a shrinkage of 23 per cent, as compared with those of the preceding fiscal year.

IMPORTS AND EXPORTS.

The following statement shows the value of the import and export trade of Calcutta in 1912-13 and 1913-14, by the four grand classes, into which official statistics divide the total trade, and the value of the imports and exports of treasure:

Articles.	Exports.		Imports.	
	1912-13	1913-14	1912-13	1913-14
Food, drink, and tobacco.....	\$65,112,000	\$57,904,000	\$27,432,000	\$30,226,000
Raw materials and produce, and articles mainly manufactured.....	139,827,000	152,080,000	7,912,000	8,940,000
Articles wholly or mainly manufactured.....	101,152,000	106,906,000	162,159,000	188,568,000
Miscellaneous and unclassified.....	850,000	745,000	1,542,000	1,610,000
Total.....	306,941,000	317,635,000	199,045,000	229,344,000
Treasure.....	467,000	1,948,000	11,843,000	12,352,000
Grand total.....	307,408,000	319,583,000	210,888,000	241,696,000

Imports of Government stores, not given in the preceding table, were valued at \$19,185,000 in 1912-13, and \$19,151,000 in 1913-14; and exports at \$431,000 and \$215,000, respectively.

DISTRIBUTION OF TRADE.

The value, by countries, of Calcutta's foreign trade in 1912-13 and 1913-14 is shown in the following table:

Countries.	Exports.		Imports.	
	1912-13	1913-14	1912-13	1913-14
United Kingdom and British possessions:				
United Kingdom.....	\$76,972,782	\$81,501,871	\$144,310,867	\$165,447,698
Australia.....	9,503,301	12,755,649	6,493,209	7,401,946
China (Hongkong).....	9,434,846	3,219,352	309,834	160,919
Straits Settlements.....	7,912,280	6,823,806	6,439,677	6,055,548
Ceylon.....	12,451,102	8,259,748	109,658	133,667
Mauritius.....	2,976,676	2,298,285	1,147,845	1,222,789
Natal.....	2,212,980	2,207,120	40,554	30,497
Cape Colony.....	1,011,908	891,543	21,413	324
Other British possessions.....	6,366,031	5,790,810	630,374	631,347
Total.....	128,841,886	124,748,184	159,503,431	181,084,735

Countries.	Exports.		Imports.	
	1912-13	1913-14	1912-13	1913-14
Foreign countries:				
Europe—				
Germany.....	\$34,680,301	\$36,401,744	\$8,824,587	\$12,089,684
Belgium.....	5,059,538	3,062,326	3,218,379	3,760,831
France.....	12,078,653	11,695,497	1,205,594	1,352,563
Austria-Hungary.....	9,871,533	12,912,771	2,899,785	3,750,449
Italy.....	7,515,498	8,007,663	1,259,128	1,661,099
Russia.....	5,883,598	6,756,973	280,310	24,657
Other countries.....	8,225,034	7,884,703	3,233,417	2,774,229
Total.....	83,314,155	86,721,677	20,941,198	25,413,512
Asia—				
Java.....	4,378,877	4,887,588	16,613,582	18,644,535
China treaty ports.....	5,988,066	3,597,965	2,666,842	2,297,637
Japan.....	5,802,166	8,937,165	8,231,680	5,058,240
Turkey in Asia.....	2,478,022	2,289,526	160,594	341,953
Arabia (excluding Aden).....	397,755	1,439,510	63,856	56,127
Other countries.....	5,673,690	5,943,294	2,016,353	2,101,030
Total.....	24,718,576	27,095,048	24,742,907	28,490,522
Africa—				
Egypt.....	2,283,037	2,301,530	355,254	328,651
Other countries.....	1,020,667	1,091,394	121,014	192,713
Total.....	3,303,704	3,392,924	476,268	521,364
America—				
United States.....	50,324,152	60,121,714	5,224,850	6,175,264
South America.....	14,436,959	14,590,416	.....	1,022
Other countries.....	1,806,120	2,023,815	324	.....
Total.....	66,567,231	76,735,945	5,224,674	6,176,886
Oceania—				
Hawaii.....	650,813	854,882	.....	.....
Other islands in Pacific.....	11,355	34,714	.....	.....
Total.....	662,168	889,596	.....	.....
Grand total.....	307,407,720	319,583,374	210,888,478	241,696,019

The foregoing table is of special interest, as it demonstrates the strong hold of Great Britain and its possessions on Calcutta import trade. In the Annual Review of the Trade of India for the fiscal year 1912-13 it was shown that the share of Great Britain and its possessions in the combined import and export trade of British India was 52.5 per cent. On the same basis, its share in Calcutta's combined trade for the fiscal year 1913-14 was 54.48 per cent, represented by 74.92 per cent of the import and 39.03 per cent of the export trade. In the value of the import trade Java figured next in importance, heavy shipments of sugar accounting for this. Germany contributed 5 per cent of the value of imports, and the United States only 2.56 per cent. In the export trade the United Kingdom was first, with 25.51 per cent of the total value. Heavy shipments of jute and its manufactures, skins, hides, and shellac to the United States placed it second in importance as a consumer of Indian products from Calcutta, its share aggregating 18.81 per cent of the total export trade of the port. Germany was third, with 11.4 per cent.

PRINCIPAL ARTICLES OF EXPORT TRADE.

The value of the more important articles, which formed the greater part of the export trade of Calcutta in the fiscal years 1912-13 and 1913-14, is shown in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Jute, manufactures of.....	\$73,861,308	\$91,488,805	Cordage and rope.....	\$196,297	\$224,806
Jute, raw.....	79,388,684	90,953,052	Fodder and bran.....	358,349	207,804
Tea.....	28,759,638	34,249,081	Horns.....	215,462	182,445
Hides and skins, raw.....	27,043,502	27,498,805	Wax (except paraffin).....	148,631	181,012
Grain, pulse, and flour.....	35,162,860	22,250,650	Animals, living.....	147,483	135,668
Seeds.....	13,349,397	11,649,626	Tobacco.....	44,088	122,145
Cotton, raw.....	3,767,189	6,554,031	Spices.....	191,346	120,679
Opium.....	18,478,730	6,533,426	Wood and timber.....	88,824	91,475
Lac.....	6,680,491	6,211,736	Cotton, manufactures of.....	54,066	65,676
Coal and patent fuel.....	2,865,190	2,242,949	Silk, manufactures of.....	113,664	61,743
Metals and ores.....	2,080,115	1,945,410	Leather.....	38,903	38,655
Hemp, raw.....	1,441,077	1,830,047	Rubber, raw.....	56,362	26,267
Oil cakes.....	1,141,628	1,371,630	Borax.....	35,641	23,433
Mica.....	1,424,157	1,152,219	All other articles.....	1,072,753	1,307,663
Manures.....	987,913	1,054,227	Total.....	305,896,372	316,566,350
Cotton, twist and yarn.....	993,253	1,010,628	Treasure:		
Salt-peter.....	1,131,059	971,412	Gold.....	45,662	1,562,946
Dyeing and tanning substances, n. e. s.	829,233	928,433	Silver.....	420,950	385,235
Provisions, etc.	771,432	889,699	Total.....	466,812	1,948,181
Oils.....	731,632	735,242	Reexports (foreign merchandise).....	1,044,534	1,068,750
Indigo.....	578,953	575,830	Grand total.....	307,407,718	319,583,281
Wool, manufactures of.....	410,910	420,944			
Apparel (except hosiery and boots and shoes).....	348,432	335,478			
Drugs and medicines.....	215,563	298,212			
Bristles.....	308,435	297,554			
Silk, raw.....	383,322	297,553			

IMPORT TRADE OF CALCUTTA.

Excluding treasure, the import trade of Calcutta increased in value from \$199,045,148 in 1912-13 to \$220,344,344 in 1913-14, an advance of 15 per cent. The comparative importance of the principal articles received during these two years is shown in the following statement:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Cotton, manufactures of....	\$94,828,846	\$96,769,426	Dyeing and tanning substances.....	\$620,388	\$629,775
Metals and ores.....	22,417,123	31,346,049	Books and printed matter.....	475,676	617,735
Sugar.....	18,516,548	20,982,292	Stationery, n. e. s.	537,784	608,549
Railway plant, etc.	6,303,867	12,680,362	Earthenware and porcelain.....	523,232	534,589
Machinery and millwork	6,801,650	10,402,713	Soap.....	483,009	527,396
Oils.....	5,734,618	6,672,323	Bicycles.....	477,952	506,773
Hardware.....	3,835,806	4,617,130	Animals, living.....	543,343	498,890
Wool, manufactures of.....	2,449,128	2,918,082	Paper-making materials.....	504,761	475,200
Instruments, etc.	1,884,464	2,354,139	Silk goods.....	443,834	444,163
Liquors, etc.	2,150,143	2,228,840	Toys, etc.	409,576	413,853
Spices.....	2,190,243	2,223,108	Carriages and carts.....	360,108	413,232
Salt.....	2,014,504	2,137,020	Leather.....	433,649	353,650
Provisions.....	2,023,682	2,124,208	Arms and ammunition.....	349,102	332,161
Glass and glassware.....	1,869,657	1,959,890	Balting for machinery.....	313,542	326,462
Motor cars and motor cycles.....	1,447,743	1,738,208	Clocks and watches.....	270,000	297,068
Paper and pasteboard.....	1,335,455	1,582,451	Cutlery.....	220,222	288,213
Drugs and medicines.....	1,217,683	1,411,718	Jewelry.....	166,290	231,947
Chemicals.....	1,192,722	1,402,540	Pitch, tar, and dammar.....	177,274	201,199
Tee cheets.....	1,114,470	1,316,970	Ships, parts of.....	6,788	195,924
Haiderdashery and millinery.....	995,547	1,283,485	Furniture, etc.	183,217	174,617
Building and engineering materials.....	991,280	1,237,688	Hemp.....	170,899	163,308
Paints and painters' materials.....	924,023	1,115,510	Gums and resins.....	219,245	124,069
Umbrellas and fittings.....	833,782	940,289	Fruits and vegetables.....	113,104	112,439
Matches.....	935,814	909,565	Grain, pulse, and flour.....	12,309	93,540
Apparel, n. e. s.	829,296	895,018	All other articles.....	3,325,911	3,771,066
Tobacco.....	849,349	816,998	Total.....	199,045,148	220,344,344
Wood and timber.....	525,155	774,853	Treasure:		
Boots and shoes.....	732,237	762,569	Gold.....	7,704,933	7,652,802
Flax.....	587,949	730,885	Silver.....	4,138,494	4,099,042
Rubber.....	112,156	675,196	Grand total.....	210,888,575	241,696,187

DECLARED EXPORTS TO UNITED STATES.

The total value of declared exports from Calcutta to the United States during the year 1913 was \$62,799,510. This total is the largest of which this office has record and shows an increase of \$23,366,328 over the value of the shipments of the preceding year.

The principal articles entering into the trade of this port with the United States were, in the order of their value, gunny cloth, jute and jute butts, skins, gunny bags, hides, and shellac. Exports of all of these showed an increase, the largest advance being in gunny cloth, shipments of which, amounting to over \$35,000,000, almost doubled the value of the exports of the preceding year. This increase in value was caused largely by the failure of the expected bumper crop on account of adverse meteorological conditions and the consequent rapid rise in raw-jute values.

The declared value of the principal articles invoiced at Calcutta for shipment to the United States in 1912 and 1913 is shown in the following table:

Articles.	Value.		Articles.	Value.		
	1912	1913		1912	1913	
TO UNITED STATES.						
Bonemeal.....	\$141,872	\$236,285	Tea.....	\$379,151	\$334,116	
Chikon.....	21,632	17,413	Wood.....	56,068	88,518	
Cotton.....	111,175	96,140	Wool.....	84,021	57,625	
Drugs.....	176,278	354,577	All other articles.....	85,080	470,161	
Gunny bags.....	3,394,100	3,871,790	Total.....	39,433,182	62,799,510	
Gunny cloth.....	18,524,137	35,183,532	TO PHILIPPINE ISLANDS.			
Hides.....	3,207,964	3,323,512	Crushed food.....	21,070	15,620	
Jute.....	6,483,326	10,140,678	Gunny bags.....	64,928	68,384	
Linseed.....	328,013		All other articles.....	14,459	7,743	
Mica.....	194,748	280,882	Total.....	100,466	91,747	
Saltpetter.....	148,789	217,224				
Shellac.....	2,342,389	2,994,682				
Skins.....	3,754,441	5,152,375				

The only exports from Calcutta to Hawaii and Porto Rico were gunny bags, valued at \$214,769 and \$30,119, respectively, in 1912, and \$186,997 and \$21,680 in 1913.

SHIPPING MOVEMENTS.

The movement of shipping at Calcutta for the official years ended March 31, 1913 and 1914, is shown by the following table:

	1912-13		1913-14	
	No.	Tons.	No.	Tons.
Entered:				
Steamers—				
With cargo.....	374	1,176,373	414	1,328,666
In ballast.....	312	822,603	242	618,959
Sailing vessels—				
With cargo.....	8	4,611	3	435
In ballast.....			1	174
Total.....	694	2,003,587	660	1,948,234
Cleared:				
Steamers—				
With cargo.....	641	1,884,605	579	1,747,663
In ballast.....	41	112,768	56	173,485
Sailing vessels—				
With cargo.....	6	863	8	435
In ballast.....				
Total.....	688	1,998,236	638	1,921,583
Grand total.....	1,382	4,001,823	1,298	3,869,817

The number of vessels engaged in foreign trade declined by 6 per cent and their tonnage by 3 per cent, but the average tonnage increased from 2,896 to 2,981. In the trade were 1,007 British vessels, 128 German, 49 Dutch, 36 Austrian, 26 Norwegian, 21 Russian, 13 Italian, 5 Swedish, and 13 native craft. The decline in entries was due to the smaller number of vessels coming in ballast, those with cargo increasing from 382 to 417 in number and in tonnage by 13 per cent. The abnormal exports of food grains and pulse of 1912-13 were not continued, and vessels clearing with cargo fell in number by 65 and in tonnage by 137,370. Those leaving in ballast increased from 41 to 56. The number of vessels clearing with full cargoes of jute was 26 and those with coal 140. The sailing vessels shown in the table consisted mainly of native craft from the Maldive Islands.

At the close of the year a direct service between Calcutta and Swedish ports was established. In 1913-14 the British India Steam Navigation Co. purchased, built, and commissioned 15 additional steamers with a net tonnage of 49,936. Of the vessels with general import cargo discharged at the Calcutta docks there were 81 against 35 during the preceding year.

BOMBAY.

A serious financial crisis, which occurred in Bombay during the latter part of 1913, resulted in the failure of some of the largest native banks in India and caused an acute depression in many lines of trade, especially in cotton piece goods and in the pearl and silver markets. Nevertheless, during the official year ended March 31, 1914, Bombay increased its imports of foreign merchandise by approximately \$16,000,000 and its exports by nearly \$33,500,000. The expansion in imports was most marked in railway plant and rolling stock, machinery and millwork, copper, iron and steel, and colored piece goods.

TRADE OF THE PORT OF BOMBAY.

The following statement summarizes the total sea-borne trade of the port of Bombay with foreign countries and Indian ports for the years ended March 31, 1913 and 1914:

Trade.	1912-13	1913-14	Trade.	1912-13	1913-14
General imports:			Coasting trade, Bombay Presidency:		
Foreign merchandise.	\$184,100,409	\$200,101,504	Imports	\$56,595,118	\$64,498,953
Treasure.....	150,434,388	102,718,013	Exports	51,752,998	44,781,368
General exports:			Total coasting trade	108,348,110	109,280,321
Indian produce.....	180,912,744	214,354,864	Aggregate Government transactions	37,103,756	22,660,735
Treasure.....	21,033,190	16,186,165	Grand total sea-borne trade.....	692,763,824	676,272,040
Reexports of foreign merchandise.....	10,831,227	10,970,438			
Aggregate foreign trade.....	547,311,958	544,330,984			

Practically the entire foreign trade of the port of Bombay is confined to three geographical divisions of trade, the British Empire, continental Europe, and Asia. The share of the British Empire constituted 45 per cent of the total trade, that of Asia 24 per cent, and that of continental Europe 28 per cent. The combined share of America and Africa amounted to only 3½ per cent of the total trade.

Imports from the United Kingdom represented 58 per cent of the total import trade; those from the United States about 2 per cent. Imports of Government stores advanced in value from \$2,037,137 in 1912-13 to \$2,583,963 in 1913-14.

GENERAL IMPORT STATISTICS.

The values of the articles imported into Bombay, exclusive of treasure and Government stores, during the two fiscal years ended March 31, 1913 and 1914, are shown in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Animals, living.....	\$434,152	\$625,986	Jute, and manufactures of.	\$224,271	\$103,716
Apparel.....	2,096,252	2,409,052	Leather, and manufac-tures of:		
Arms and ammunition.....	255,164	257,871	Boots and shoes.....	572,412	746,657
Art, works of.....	55,514	53,478	All other.....	561,317	461,359
Bicycles.....	301,721	231,315	Liquors.....	1,910,511	1,934,377
Books and printed matter.....	680,229	742,384	Matches.....	913,227	834,375
Building material.....	829,740	1,097,921	Metals and ores.....	15,970,070	23,244,825
Candles.....	56,154	44,741	Motor cars and motor		
Carriages, carts, etc.....	342,641	262,807	cycles.....	1,735,549	1,791,078
Chemicals.....	1,059,985	1,020,680	Oilcloth and floorcloth.....	155,369	171,097
Clocks and watches.....	400,005	386,718	Oils.....	3,757,149	4,357,590
Coal.....	3,230,807	2,730,042	Paints, etc.....	894,768	880,669
Cordage and rope.....	110,957	128,990	Paper and pasteboard.....	1,755,394	1,888,547
Cotton, and manufactures of:			Provisions.....	1,541,156	1,419,044
Raw.....	6,848,117	805,182	Rubber.....	387,425	801,881
Twist and yarn.....	4,510,638	4,850,032	Seeds.....	128,711	179,145
All other manufactures	47,123,396	53,563,879	Silk, and manufactures of:		
Drugs and medicines.....	1,457,721	1,617,786	Manufactures.....	6,948,523	7,331,856
Dyeing and tanning mate-rials.....	3,561,487	3,243,509	Raw.....	4,367,122	3,171,434
Earthenware and porcelain.....	615,822	703,341	Soup.....	754,887	810,001
Fireworks.....	197,987	146,080	Spices.....	1,275,849	1,390,431
Fish.....	240,843	192,102	Stationery.....	1,008,467	1,042,088
Flax, and manufactures of.	356,512	459,378	Sugar.....	13,368,741	12,447,461
Glass and glassware.....	2,632,776	2,917,580	Tallow and stearin.....	461,659	421,403
Grain, pulse, and flour.....	209,854	543,212	Tea.....	530,963	593,082
Gums and resins.....	627,963	493,010	Tobacco.....	504,052	548,397
Haberdashery and mill-inery.....	2,052,597	2,394,736	Toys, etc.....	522,963	617,987
Hides and skins, raw.....	208,399	287,957	Umbrellas, etc.....	302,238	441,332
Hops.....	49,773	18,140	Wood, and manufactures		
Instruments, etc.....	1,840,631	2,307,737	of:		
Iron and steel, manufac-tures of:			Furniture.....	287,901	312,250
Hardware and cutlery.....	4,201,542	4,595,194	All other.....	1,106,525	1,346,997
Machinery and mill-work.....	6,818,117	10,018,077	Wool:		
Railway plant and roll-ing stock.....	9,978,159	13,834,179	Manufactures.....	4,189,633	5,283,098
Ivory.....	717,608	742,748	Raw.....	524,206	459,676
Jewelry and precious stones.....	3,767,713	3,668,223	Imports (not specified) by		
			parcel post.....	4,249,375	4,408,374
			All other articles.....	5,318,992	3,177,210
			Total.....	184,100,404	200,101,504

The chief increases were in instruments and apparatus; glass and glassware, chiefly of Austrian and German manufacture; building and engineering material, caused by continued activity in house building in Bombay; paper, pasteboard, and stationery; spices, mainly betel nut from the Straits Settlements and cloves from Zanzibar; matches, principally of Swedish and Japanese origin; living animals, due to larger shipments of horses from the United Kingdom, Australia, and Turkey in Asia; and rubber, explained by the inclusion under this head of tires and inner tubes of motor and other cars and cycles that were formerly classed as "parts of motor and other cars and cycles."

In connection with the increase in imports of apparel it may be mentioned that the share of the United Kingdom in this trade amounted to about 40 per cent of the total value. France was the chief exporter of gold and silver thread and Italy of hats, caps, and

bonnets, imports of the former from Russia and of the latter from Austria-Hungary showing a decrease. The United Kingdom continued to supply most of the boots and shoes, imports from other countries amounting to 13 per cent only.

The value of drugs and medicines showed a material increase. These included largely proprietary and patent medicines, chiefly from the United Kingdom, but a fair amount from the United States; camphor and cassia lignea from China; and asafetida from Persia.

Among the articles of import trade in which the United States made an important and encouraging showing may be mentioned hardware, machinery and millwork, motor cars and motor cycles, and kerosene.

HARDWARE.

The share of the United States in hardware imports into Bombay increased during the last year from 6.4 to 8.8 per cent, while that of the United Kingdom receded from 54.9 to 52.5 per cent. Builders' hardware (locks, hinges, door bolts, etc.) and domestic hardware were supplied chiefly by Germany; enameled hardware, by Austria-Hungary; and implements and tools, other than agricultural, by the United States. Metal lamps and parts of lamps were imported from Germany, Austria-Hungary, and the United States. The following table shows the value of imports of hardware by countries in 1912-13 and 1913-14:

Countries.	1912-13	1913-14	Countries.	1912-13	1913-14
United Kingdom.....	\$2,171,450	\$2,249,342	Belgium.....	\$83,198	\$89,604
Germany.....	936,072	952,932	All other countries.....	164,352	208,596
Austria-Hungary.....	347,091	403,716	Total.....	3,955,851	4,281,904
United States.....	253,685	377,803			

MACHINERY AND MILLWORK—AUTOMOBILES.

In the following table the imports of some of the most important articles of machinery and millwork with the sources of supply during 1913-14 are compared with those of the preceding year:

Machinery and millwork.	1912-13	1913-14	Machinery and millwork.	1912-13	1913-14
Prime movers.....	\$799,834	\$1,247,357	Machinery (not prime movers or electrical)—Contd.		
United Kingdom.....	770,948	1,126,463	Textile machinery.....	\$2,861,144	\$5,132,712
Germany.....	14,329	94,689	United Kingdom.....	2,797,008	5,004,210
United States.....	8,284	10,849	Germany.....	35,435	34,430
Other countries.....	6,272	15,355	United States.....	15,081	35,318
Electrical machinery.....	448,145	682,544	Other countries.....	13,620	58,753
United Kingdom.....	355,209	535,321	Typewriters.....	86,103	104,716
Germany.....	49,643	129,020	United Kingdom.....	28,962	28,871
United States.....	13,439	5,165	Germany.....	875	932
Other countries.....	29,793	13,036	United States.....	54,753	76,447
Machinery (not prime movers or electrical):			Other countries.....	1,511	1,466
Mining.....	12,422	14,559	All other.....	2,249,828	2,584,968
United Kingdom.....	3,640	4,926	United Kingdom.....	2,012,015	2,211,009
Germany.....	281	341	Germany.....	142,665	208,332
United States.....	8,500	9,291	United States.....	79,503	98,202
Sewing and knitting machines.....	360,538	251,219	Other countries.....	15,642	67,424
United Kingdom.....	278,945	199,447	Total.....	6,818,017	10,018,077
Germany.....	77,304	44,079			
United States.....	1,037	1,140			
Other countries.....	3,251	6,552			

KEROSENE, CRUDE OIL, AND GASOLINE.

Imports of kerosene from foreign countries into Bombay amounted to 8,750,000 gallons in 1913-14, there being a slight decrease in quantity, but a slight increase in value over the preceding year. The imports of Burma oil, which is considered a domestic oil, amounting to nearly 20,000,000 gallons, represented an increase in both quantity and value. Burma oil is now imported more largely than the foreign product. Bulk oil arrived in greatly increased quantities from Dutch Borneo, at the expense of Russia, while imports of American oil, both bulk and case, advanced, but were still far behind the high level of 1911-12. The proportion of case oil, all of which comes from the United States, to bulk oil is steadily increasing, and now represents over 21 per cent of the total foreign kerosene. Persian oil suddenly assumed considerable importance in the bulk-oil market, more than 1,000,000 gallons being imported during the year under review.

The predominating feature of the oil trade in 1913-14, however, was the increase of about 100 per cent in the imports of liquid fuel, the supplies of which were received from two entirely new sources, Persia and Suez. Bombay's imports of petrol (gasoline) during the year under review amounted to 767,000 gallons, against 460,000 gallons in 1912-13; of this quantity Burma supplied 96 per cent and the United States 4 per cent.

During 1913-14 prices were maintained at a high level. The increasing importance of the oil trade in Bombay was illustrated by the erection during the year of two new storage tanks, each of a capacity exceeding 1,000,000 gallons, by the Standard Oil Co. and the Anglo-Persian Oil Co. for kerosene and liquid fuel, respectively.

The distribution of kerosene from Bombay to East African and Persian Gulf ports declined to a negligible quantity, and shipments to Indian ports did not increase.

EXPORTS OF INDIAN PRODUCE AND MANUFACTURES.

Of the total exports of Indian produce and manufactures from Bombay about 92 per cent of the value was represented by shipments of raw cotton, seeds, cotton twist and yarn, grain, pulse, flour, opium, raw wool, cotton manufactures, and metals and ores.

In pursuance of diplomatic agreements with China the number of chests of Malwa opium fixed for export in the year 1913 was 14,860. Raw cotton was of first importance in the export trade, followed by seeds. Exports of raw cotton in 1913-14 were the highest on record, the increased shipments being in marked contrast with the decline noted in the two preceding years.

In the following table the relative value of the more important exports from Bombay to all countries during the fiscal years ended March 31, 1913 and 1914, are shown:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Apparel.....	\$115,913	\$113,579	Fish.....	177,912	188,699
Books and printed matter.....	139,327	143,138	Fruits and vegetables.....	453,370	714,556
Cotton, and manufactures of:			Grain and pulse.....	14,905,131	14,731,768
Raw.....	57,052,394	96,353,559	Gums and resins.....	253,519	315,300
Yarn and twist.....	30,067,940	29,871,195	Hemp, raw.....	1,404,762	1,184,123
Other manufactures.....	3,742,063	3,574,589	Hides and skins.....	2,307,919	2,222,600
Drugs.....	101,268	122,847	Horns and horn meal.....	381,783	184,651
Dyeing materials.....	243,994	247,329	Jute, manufactures of.....	226,472	208,982
			Leather.....	2,575,136	2,311,488

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Manures.....	\$539,071	\$657,574	Toys, etc.....	\$76,104	\$76,176
Metals.....	3,352,458	3,574,580	Wood, and manufactures of:		
Myrobalans.....	1,149,702	896,291	Furniture.....	119,388	102,970
Oils.....	290,820	334,758	All other.....	203,995	173,086
Oil cakes.....	\$349,158	\$594,989	Wool, and manufactures of:		
Opium.....	17,922,458	4,560,937	Raw.....	3,825,559	3,927,664
Provisions.....	476,731	537,110	All other.....	270,700	222,321
Seeds.....	33,432,550	40,703,224	All other articles.....	1,469,200	1,190,307
Silk, and manufactures of.....	100,321	100,847	Articles exported by par- cel post.....	1,544,722	2,164,750
Spices.....	886,700	711,676	Total.....	180,912,744	214,354,964
Sugar.....	163,866	152,253			
Tea.....	356,273	494,607			
Tobacco.....	242,392	398,523			

The exports to the United States during the calendar years 1912 and 1913, as invoiced at this consulate, were as follows:

Articles.	1912	1913	Articles.	1912	1913
Antiques.....		\$20,281	Ore, manganese.....	\$718,519	\$512,398
Bonedust.....	\$19,152	31,134	Pearls and gems.....	21,971	6,619
Brassware.....	10,236	694	Seeds:		
Carpets and rugs.....	84,038	68,671	Ajwan.....		10,308
Condiments.....	9,204	8,159	Castor.....	930,708	929,026
Cotton and cotton waste.....	53,338	139,860	Flax.....	299,657	
Curios.....	6,340	5,175	Linseed.....	79,600	
Drugs and chemicals.....	10,286	9,993	Mustard.....	5,600	2,049
Fish maws and sounds.....	21,242	12,312	Rape.....	3,087	
Fleshings, hide.....	4,284		Sesame (til or gingelli).....		4,338
Gums:			All other.....	2,386	541
Arabic.....	5,563	1,676	Skins, sheep and goat.....	1,566,767	2,026,104
Asafetida.....	7,842		Spices:		
Ghati.....	9,910	14,095	Capsicum.....	135,888	2,651
Kadaya.....	46,901	57,445	Cardamom.....	16,230	16,186
Olibanum (frankincense).....	3,171	4,918	Ginger.....	11,284	10,284
All other.....	2,122	6,340	Mace.....	12,152	8,319
Gunnies, jute.....	5,192	13,745	Textiles:		
Hemp.....	8,396		Turmeric.....	5,242	
Ivory.....		2,303	Wool.....	15,485	7,637
Kapok.....	9,548	27,384	All other articles.....	20,280	14,179
Myrobalans.....	120,339	82,075	Total.....	10,290	13,556
Nuts, cashew.....	50,200	103,956			
Oils, essential:					
Ginger grass.....	1,820	1,836			
Rosa.....	20,154	5,623			

SHIPPING RETURNS.

The particulars of the shipping during 1913-14, as compared with the preceding year, are shown in the following statement:

Vessels.	1912-13		1913-14	
Entered:				
Steamers—				
With cargo.....	Number. 650	Tons. 1,993,534	Number. 662	Tons. 1,992,169
In ballast.....	104	276,013	101	271,281
Sailing vessels—				
With cargo.....	163	20,464	142	14,882
In ballast.....	1	177		
Total.....	918	2,190,188	905	2,278,332
Cleared:				
Steamers—				
With cargo.....	571	1,610,650	610	1,818,005
In ballast.....	26	80,335	38	121,231
Sailing vessels—				
With cargo.....	118	16,023	113	12,055
In ballast.....				
Total.....	715	1,707,008	770	1,951,201
Grand total.....	1,633	3,897,196	1,675	4,229,623

In the distribution of the tonnage according to flags there were no significant changes. Great Britain's share was reduced from 67 to 66 per cent; Germany, with a percentage of 11, stood second; and Austria-Hungary followed with 8 per cent. Japan and France absorbed 6 per cent and 4 per cent, respectively, while Italy's percentage fell from 5 to 3. There were no merchant ships from the United States in Bombay during 1913-14.

FACTORIES IN THE BOMBAY PRESIDENCY.

The report of the Chief Inspector of Factories for the Bombay Presidency for the year 1913 shows that the number of factories subject to the control of the Indian factories act increased from 687 in 1912 to 743 in 1913. Most of the industries carried on in these factories relate to the manufacture of cotton goods. There are also printing presses, bone-crushing factories, lock and safe works, and furniture works, also two paper mills and one soap factory. In the city and island of Bombay there are 80 factories devoted to spinning and weaving, and in Ahmedabad there are 57 factories. Bombay also has one hosiery factory, two silk and two woolen mills. The total number of operatives employed during the year under review was 265,975, as against 259,845 in the previous year. The total number of women engaged in Bombay and the country districts was 51,171, as against 49,486 in 1912. The total number of children similarly engaged was 14,219, as against 14,344 in the preceding year. Accidents in Bombay factories caused the death of 43 persons in 1913-14.

MADRAS.

[By Consul José de Olivares.]

The total sea-borne trade of the Madras Presidency for the official year ended March 31, 1914, amounted to \$188,688,210, compared with \$178,434,501 in 1912-13 and \$167,688,639 in 1911-12. A general summary of the total trade for the two years under report shows the following results: Foreign imports, 1912-13, \$43,350,163; 1913-14, \$54,181,302; foreign exports, 1912-13, \$80,289,544; 1913-14, \$87,280,269; coasting imports, 1912-13, \$29,788,479; 1913-14, \$28,147,142; coasting exports, 1912-13, \$22,728,826; 1913-14, \$18,179,498. From a comparison of the foregoing figures it will be seen that the entire gain was from foreign trade, material decreases having been sustained in all branches of the coasting trade.

FOREIGN COMMERCE BY COUNTRIES.

The distribution of the foreign trade, excluding treasure and Government stores, of the Madras Presidency by countries during the years 1912-13 and 1913-14, is shown by the following table:

Countries.	Imports.		Exports.	
	1912-13	1913-14	1912-13	1913-14
United Kingdom.....	\$27,365,000	\$36,144,000	\$21,584,000	\$22,161,000
British possessions.....	8,997,000	4,917,000	20,184,000	22,805,000
Austria-Hungary.....	958,000	887,000	1,586,000	1,416,000
Belgium.....	1,474,000	2,091,000	3,857,000	3,761,000
France.....	1,369,000	1,562,000	12,755,000	13,909,000
Germany.....	2,114,000	2,986,000	7,550,000	8,020,000
Italy.....	56,000	74,000	903,000	1,286,000
Japan.....	323,000	444,000	5,624,000	4,537,000
Java.....	1,642,000	1,443,000	80,000	81,000
Netherlands.....	177,000	225,000	619,000	801,000
Portugal.....	4,000	5,000	104,000	128,000
Russia.....	31,000	2,000	292,000	510,000
Spain.....	9,000	6,000	329,000	146,000
Sweden.....	417,000	360,000	73,000	89,000
Switzerland.....	69,000	88,000	.....	.....
United States.....	1,607,000	1,484,000	2,674,000	2,383,000
All other countries.....	690,000	333,000	2,710,000	1,925,000
Total.....	42,302,000	53,060,000	80,924,000	84,058,000

The largest trade was with the British Empire, being 63 per cent of the whole and representing an expansion of 31 per cent in imports and 8 per cent in exports, as compared with the business of the preceding year. Trade with the United Kingdom was characterized by heavy imports of cotton goods, railway materials, metals, machinery, hardware, motor vehicles, scientific instruments, and articles imported by post; and increased exports of raw jute, tea, coffee, rubber, tanned skins, coir, and mica. With other countries results were variable, involving a general enhancement with those in Europe. Trade with Germany increased by 14 per cent, due to enlarged imports of railway plant and rolling stock, copper, iron, and steel, and heavier exports of raw jute, pepper, and peanuts. The large demand in Russia for Indian copra materially improved the volume of trade with that country, while business with the Netherlands increased by reason of imports of cotton twist and exports of coir and cotton. Import trade by post with France and exports thereto of increased quantities of peanuts, copra, and raw jute brought about an advancement of 9 per cent in the business with that country. Trade with Italy expanded owing to increased imports of raw cotton and pepper.

On the other hand, there was a marked decline in commercial transactions with Spain, due to a decrease in cotton exports; and with Austria-Hungary, owing to smaller imports of sugar and a falling off in raw cotton exports. Losses with the Far East and America were brought about by reduced exports of cotton twist and yarn to China, by decreased imports of sugar from Java, smaller shipments of raw cotton and sheepskins to Japan, and by reduced sales of kerosene and smaller purchases of hides and skins on the part of the United States. The net result of India's trade with countries other than the Indian Empire was an increase of 2 per cent over that of the preceding year.

PRINCIPAL ARTICLES IMPORTED.

The principal articles imported into the Madras Presidency during 1913-14, together with their value and relative importance as com-

pared with those of the preceding year, are shown in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Cotton, manufactures of.	\$10,701,193	\$15,202,588	Wool, and manufactures of.	\$240,473	\$275,117
Metals and ores.....	4,159,961	6,270,226	Paints and painter's materials.....	211,669	226,830
Cotton twist and yarn.....	8,620,261	9,974,031	Manures.....	152,467	211,543
Railway plant, etc.....	2,110,227	3,982,707	Silk, and manufactures of..	268,705	211,341
Machinery and millwork.....	1,883,813	2,332,837	Wood and timber.....	274,494	201,110
Sugar.....	2,199,994	2,053,847	Bicycles.....	210,753	193,802
Spices.....	1,546,388	1,750,686	Coal and patent fuel.....	146,077	179,554
Oils.....	1,303,121	1,404,753	Tobacco, and manufactures of.	122,399	170,217
Hardware.....	1,117,190	1,364,156	Hides and skins, raw.....	202,126	165,124
Apparel (except boots and shoes).....	1,271,273	1,321,515	Animals, living.....	112,149	146,666
Provisions, etc.....	811,894	898,042	Books and printed matter.....	121,150	141,286
Papers and pasteboard.....	730,086	788,314	Leather.....	143,984	139,979
Motor cars and motor cycles.....	540,849	759,119	Toys, etc.....	109,317	120,369
Liquors, etc.....	643,052	702,140	Earthenware and porcelain.....	103,890	118,679
Glass and glassware.....	563,573	669,233	Tea chests.....	117,563	110,356
Instruments, etc.....	470,848	555,361	Fruits and vegetables.....	119,855	109,596
Dyeing and tanning substances.....	537,408	498,905	Jewelry, etc.....	120,948	101,161
Jute, and manufactures of.	354,000	368,899	Furniture, etc.....	88,519	98,566
Drugs and medicines.....	358,019	366,927	Printing materials.....	73,861	98,779
Building and engineering materials.....	513,643	364,507	Gums and resins.....	88,484	92,890
Matches.....	395,378	361,947	Candles.....	91,949	92,207
Soap.....	282,198	357,213	Boots and shoes.....	68,343	88,860
Haiderdashery and millinery.....	305,860	352,987	Cotton, raw.....	182,620	70,732
Chemicals, etc.....	316,025	346,553	All other articles.....	1,613,560	1,998,347
Arms and ammunition.....	363,279	330,308	Total.....	42,301,816	53,059,864
Stationery (excluding paper).....	236,928	318,252			

EXPORTS OF INDIAN MERCHANDISE.

The following table gives the chief articles of foreign export from the Madras Presidency for 1913-14, showing their relative value and importance compared with those of the preceding year:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Seeds.....	\$15,220,931	\$17,101,857	Fiber for brushes and brooms.....	\$455,571	\$433,593
Leather.....	12,194,698	11,050,874	Dyeing and tanning substances.....	421,613	412,925
Cotton, raw.....	13,217,456	9,760,871	Tobacco, and manufactures of.	307,910	335,861
Grain and pulse.....	5,543,557	8,803,559	Hemp, and manufactures of.....	249,952	306,266
Coffee.....	4,940,761	4,873,024	Sugar.....	657,298	288,665
Tea.....	4,411,177	4,740,569	Provisions, etc.....	277,571	283,340
Cotton, manufactures of.	3,532,555	3,266,024	Mica.....	210,133	274,479
Coir, and manufactures of.	2,873,623	2,910,161	Drugs and medicines.....	288,881	246,619
Jute, and manufactures of.	394,386	5,522,356	Wool, and manufactures of.	195,395	122,246
Spices.....	1,848,713	2,049,386	Horn and hornmeal.....	128,895	112,840
Rubber, and manufactures of.	1,343,057	2,045,663	Silk, and manufactures of..	88,677	109,242
Oil cakes.....	1,904,274	1,788,988	Building and engineering materials.....	89,753	103,809
Oils.....	1,059,021	1,432,776	Metals and ores.....	140,715	92,425
Articles exported by post.	1,047,778	1,243,923	Fodder, bran, and pollard.....	151,876	76,370
Fruits and vegetables.....	859,957	1,034,314	All other articles.....	558,733	549,519
Cotton twist and yarn.....	1,067,233	1,006,657	Total.....	80,270,651	83,389,526
Animals, living.....	898,090	999,915			
Hides and skins, raw.....	1,613,851	879,244			
Fish (not canned).....	765,161	792,347			
Wood and timber.....	680,694	757,391			
Manures.....	501,705	581,425			

TRADE WITH THE UNITED STATES.

The total trade between the Madras Presidency and the United States during the year ended March 31, 1914, amounted to \$3,866,921, as compared with \$4,281,072 in 1912-13 and \$4,112,671 in 1911-12. These decreases are accounted for by a falling off in the importation of American kerosene, due to the keenness of competition with the

Burma oil fields and to a diminution in raw-skin exports to the United States, owing to a more favorable market for that commodity in Europe. Another disturbing factor was the total cessation in 1913-14 of American raw-cotton imports, due in a measure to increasing production of that staple in this country. Nevertheless, the volume of trade, import and export, between the two countries in 1913-14 represented a gain of \$353,957 over the average annual figures for five years ending March 31, 1912.

Direct imports into the Presidency from the United States in 1913-14 amounted to \$1,483,958, compared with \$1,607,424 in 1912-13 and \$1,708,692 in 1911-12. There was, however, a gain of \$163,514 in 1913-14, as compared with the average for the five years ended March 31, 1912.

The value of the principal articles imported into the Madras Presidency from the United States during the official years 1912-13 and 1913-14 is shown in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Kerosene.....	\$887,594	\$836,836	Clocks and watches.....	\$12,838	\$15,101
Motor vehicles and accessories.....	86,538	134,981	Cabinetware and furniture.....	12,278	10,196
Lubricating and other oils.....	86,102	88,843	Rosin.....	12,582	8,973
Hardware and cutlery.....	58,490	52,641	Printing materials.....	4,420	8,497
Machinery.....	21,167	45,103	Paints and colors.....	1,870	8,472
Scientific instruments.....	30,825	44,206	Arms and ammunition.....	3,782	5,441
Aluminum sheets, circles, and ingots.....	55,441	42,418	Apparel and millinery.....	5,886	5,243
Provisions and spirits.....	35,706	31,203	Soap.....	3,359	4,274
Playing cards.....	23,312	30,392	Books.....	3,909	2,204
Iron and steel, manufactures of.....	49,333	18,652	Raw cotton.....	100,234	.....
Drugs and medicines.....	14,639	15,310	All other articles.....	88,140	74,972
			Total.....	1,607,424	1,483,958

The decrease in petroleum and metals and the cessation of raw cotton imports was compensated for by substantial gains in other important lines, such as motor vehicles and accessories, which in 1913-14 increased by \$48,443, machinery by \$23,936, scientific instruments by \$13,381, playing cards by \$7,080, paints and colors by \$6,602, printing materials by \$4,077, and clocks and watches, by \$2,263.

EXPORTS TO UNITED STATES.

According to customs returns from all ports of the Madras Presidency, the value of the exports to the United States during the official year 1913-14 was \$2,382,963, against \$2,673,648 in 1912-13 and \$2,403,979 in 1911-12.

The following statement, compiled from these customs statistics, shows the value of the principal articles exported to the United States from the Madras Presidency in 1912-13 and 1913-14:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Hides, skins, and fleshings.....	\$1,593,249	\$1,214,725	Lemongrass oil.....	\$19,270	\$16,142
Coconut oil.....	212,329	291,344	Palmyra fiber.....	9,882	9,565
Pepper.....	141,521	217,552	Teak and rosewood timber.....	3,446	8,909
Cof, manufactures of.....	161,061	132,266	Turmeric.....	9,291	6,281
Castor seeds.....	88,830	113,583	Rugs and carpets.....	5,749	6,049
Sandalwood.....	76,980	100,052	Tea.....	50,219	520
Jute.....	69,286	69,286	Manganese ore.....	69,326	.....
Ginger.....	53,219	40,622	All other articles.....	123,350	106,584
Senna leaves.....	37,275	32,567	Total.....	2,673,648	2,382,963
Nux vomica.....	23,651	16,917			

Decreases in hide products, manganese, tea, ginger, nux vomica, and senna leaves were largely offset by gains in other products, among which were: Coconut oil, \$79,015; pepper, \$76,031; jute, \$69,286; castor seeds, \$29,752; and sandalwood, \$23,072.

DECLARED EXPORTS TO UNITED STATES.

The declared value of exports from the consular district of Madras to the United States for the calendar year ended December 31, 1914, amounted to \$1,756,834, an increase of \$57,707 over that of the preceding year. This result is remarkable because of the fact that, owing to the outbreak of war in August and the resultant decrease in shipping facilities, the value of declared exports for the second half of the year amounted to only \$655,994 as compared to \$1,101,040 for the first six months, during which period exports to the United States increased beyond all previous records in the history of the consulate.

The following statement shows the value of the principal articles invoiced at the Madras consulate for shipment to the United States in 1913 and 1914:

Articles.	1913	1914	Articles.	1913	1914
Castor seeds.....	\$112,740	\$177,670	Sandalwood.....	\$32,755	\$75,170
Coi mats and yarn.....	4,989	15,924	Senna.....	1,239	4,656
Druggets, woolen.....	9,239	3,349	Skins, goat and sheep: Dry salted.....	228,384	160,253
Fiber, palmyra.....	21,507	20,878	Tanned.....	1,031,300	885,368
Fleshings, hide.....	67,725	77,224	Wet salted.....	4,002	220,426
Goat hair.....		3,431	Soapstone.....	4,444	.....
Hides, tanned.....	20,757	55,152	Turmeric.....		5,325
Jute.....	5,943	15,795	All other articles.....	10,670	55,707
Logs, rosewood.....	7,640	1,179	Total.....	1,699,027	1,756,834
Manganese ore.....	129,097	.....		
Nux vomica.....	6,596	21,520			

The figures fail to indicate the extent to which various exports actually increased under normal conditions, in some cases showing a decrease instead. For example, the commodity most largely exported from this district, namely, tanned goat and sheep skins, is shown to have decreased in value from \$1,031,300 in 1913 to \$885,368 in 1914. This is explained by the fact that the value of this export fell from \$282,373 for the March quarter, when shipping facilities were unimpaired, to \$101,434 for the September quarter, when the effect of the war on shipping was most keenly felt. However, with the removal of some of the obstacles to shipping during the December quarter, the value of tanned goat and sheep skins immediately increased to \$293,011.

Wet salted goat and sheep skins show a decided advance, having increased by \$216,424 over 1913. Other exports which show substantial improvement are castor seeds, which increased by \$64,960, sandalwood by \$42,415, tanned hides by \$34,395, nux vomica by \$14,924, coir mats by \$10,497, jute by \$9,852, hide fleshings by \$9,499, and turmeric by \$5,325.

Exports showing a marked falling off are dry salted goat and sheep skins, which decreased by \$68,131, rosewood logs by \$6,461, and woolen druggets by \$5,890. The reason for the foregoing decreases may be attributed directly or indirectly to the war. The exportation of manganese ore to the United States, the declared value of which in

1913 was \$129,097, ceased entirely in 1914, owing to the prevalence prior to the war of better prices in European markets.

Returned American goods amounted to \$309 in 1914, compared with \$1,227 in the preceding year.

CONSTRUCTION WORK—MADRAS HARBOR WORKS.

No year in the history of south India has witnessed so great a progress in general construction work as 1912–13. The expenditures on provincial, imperial, civil, military, local, and contribution works in the Madras Presidency during that period amounted to \$2,173,379, which represents an increase of \$330,193 over the preceding year.

The direct activities of the public works authorities as regards port and marine works are limited to the subordinate ports of the Presidency, for the reason that the important artificial harbor works at Madras are under the supervision of an organized trust.

It is doubtful if any port in the world has acquired so much in the way of efficacious artificial harbor facilities, with no natural attribute to serve as a basis or nucleus, as that of Madras. The landing place at Madras was originally an entirely open and exceedingly dangerous roadstead, which under the most favorable circumstances afforded only a precarious anchorage to vessels, whose cargoes and passengers were lightered through a treacherous surf by the most primitive of native craft. This, the Madras Port Trust, through resolute effort, skillful engineering, and unstinted financial expenditures, has made into a harbor which, for comparative security and up-to-date equipment, is second to none of its size in existence.

The total expenditures on the harbor works at Madras from 1883–84 up to the end of 1913–14 aggregated \$8,602,002.

The total value of the trade passing through the port of Madras during the year ended March 31, 1914, was \$78,247,480, constituting an increase of \$7,249,138 over the preceding year and representing 41 per cent of the aggregate trade of the Madras Presidency.

MANUFACTURING.

On account of the difficulties encountered in the collection of data necessary for the preparation of accurate statistics relative to manufacturing in the Madras consular district, the latest official report on that subject deals with the calendar year 1912. Figures covering that period as compared with preceding years show good progress in this important industry. The total number of factories on the official register at the end of 1912 was 268, compared with 208 at the close of the preceding year. During the year under report there were in south India 16 cotton mills with 391,132 spindles and 3,217 looms, and 2 jute mills operating 5,032 spindles and 234 looms; while 60 factories were recorded as engaged in ginning and pressing cotton. There were 68 rice mills, 21 tile works, 13 railway workshops, 7 iron and brass foundries, and 6 carpentry works.

The average daily wages of factory hands in the main classes of manufacturing, according to latest statistics (1912), are as follows.

Class of labor	Textile.	Alumi-num.	Engi-neering.	Rice mill.	Jute mill.	Cotton ginning.	Sugar.	Tie works.
SKILLED.								
Blacksmith.....	\$0.23	\$0.28	\$0.21	\$0.17	\$0.22	\$0.22	\$0.20	\$0.20
Fitter.....			.22	.24	.....	.43	.16	.....
Carpenter.....	.20	.18	.19	.23	.20	.26	.18	.18
Bricklayer.....	.20		.20	.19	.10	.17	.12	.15
Mason.....				.16				
Weaver man.....	.12				.08			
Spinner man.....	.08	.22						
Dyer.....	.08							
Molder.....	.28	.20	.17		.10		.19	.25
Engine driver.....	.44	.43	.23	.22	.30	.30	.09	.16
Boiler man.....	.16	.20	.21	.13	.....		
UNSKILLED.								
Messenger.....	.09	.09	.10	.06	.....		
Coolie or porter.....	.10	.08	.11	.08	.....		
Coolie woman.....	.06	.....		.05	.....		

The general conditions affecting factory employees showed a tendency to improve as compared with former years. All establishments were provided with a sufficiency of water suitable for drinking purposes. More attention was given to general sanitation, and in most instances safeguards were provided against accidents. The fact that the number of accidents recorded rose from 308 in 1911 to 466 in 1912 is explained by the greater interest taken by managers of factories in reporting occurrences of minor importance, the number of minor accidents recorded in 1911 having been 256, as against 449 during the year under report.

RANGOON.

[By Consul Maxwell K. Moorhead.]

The sea-borne trade of the Province of Burma with foreign countries and the British Empire (including the other Provinces of India) for the year ended March 31, 1914, amounted to \$232,440,690, as against \$227,742,210 during the year ended March 31, 1913. The value of the total import and export trade with India proper and other countries for the two years is given in the table following.

The term "total Burma trade" covers trade between Burma and the rest of India as well as with foreign countries. This mode of considering the trade of Burma originated, naturally, when Burma was not yet a part of the Indian Empire.

Countries.	Imports.		Exports.	
	1912-13	1913-14	1912-13	1913-14
British India (excluding Burma):				
Merchandise.....	\$32,741,020	\$31,389,540	\$31,998,970	\$48,894,250
Treasure.....	16,093,680	11,962,120	6,177,300	6,482,210
Total.....	48,834,700	43,341,660	38,176,270	55,376,460
All other foreign countries:				
Merchandise.....	45,366,640	52,417,400	93,218,010	77,568,350
Treasure.....	2,140,730	2,531,620	10,860	1,205,200
Total.....	47,507,370	54,949,020	93,228,870	78,773,550
Total merchandise.....	78,107,660	83,806,940	125,211,980	126,462,600
Total treasure.....	18,234,410	14,483,740	6,188,160	7,687,410
Grand total.....	96,342,070	98,290,680	131,400,140	134,150,010

DISTRIBUTION OF TRADE.

The annual average value of merchandise imported from all foreign countries into the Province of Burma during the five years ended March 31, 1914, was \$41,000,190, of which \$30,248,970 represented imports from Europe, \$8,688,620 from Asia (excluding India proper), and \$1,779,060 from the United States. The United Kingdom supplied imports of an annual average value of \$22,929,670; Germany, \$2,478,670; Austria-Hungary, \$596,560; the Netherlands, \$1,674,890; Belgium, \$1,363,580; Japan, \$2,720,440; Straits Settlements, \$2,760,500; China, \$1,403,670; and Netherlands East Indies, \$1,591,270.

During the year ended March 31, 1914, exports to Europe from Burma of domestic merchandise were valued at \$44,948,130, as against imports from Europe valued at \$40,013,370, leaving a balance of trade in favor of Burma of \$4,934,760. The balance of trade in favor of Burma with Germany and Austria was \$13,592,550 (exports, \$18,084,440; imports, \$4,491,890); Netherlands, \$7,670,780 (exports, \$9,716,760; imports, \$2,045,980); France, \$877,410 (exports, \$1,382,960; imports, \$505,550). On the other hand, trade with the United Kingdom showed a balance against the Province of Burma of \$17,268,340 (exports, \$11,634,970; imports, \$28,903,310).

The following table shows the distribution, by countries, of the imports into Burma during the last five years:

Countries.	1909-10	1910-11	1911-12	1912-13	1913-14
EUROPE.					
United Kingdom.....	\$20,223,420	\$19,126,670	\$21,139,670	\$25,255,280	\$28,903,310
Germany.....	1,491,400	1,898,520	2,331,970	2,958,630	3,712,810
Netherlands.....	1,540,090	1,657,440	1,437,670	1,683,290	2,045,980
Belgium.....	785,990	986,200	1,058,060	1,209,190	2,778,490
Austria-Hungary.....	372,330	517,980	527,700	785,710	779,980
France.....	369,220	378,360	473,090	426,730	505,580
Italy.....	227,790	233,310	197,810	241,300	503,600
Switzerland.....	168,010	120,070	86,140	173,880	163,280
Portugal.....	129,380	118,520	114,980	146,000	342,000
Spain.....	48,560	45,950	58,390	39,860	44,540
Denmark.....	58,880	43,410	58,980	59,780	76,380
Norway and Sweden.....	55,100	48,560	24,560	81,830	92,810
All other.....	720	1,100	550	3,540	540
Total.....	25,470,870	25,176,090	27,509,550	33,074,950	40,013,370
AMERICA.					
United States.....	1,644,820	2,016,670	1,761,710	1,874,510	1,897,600
Canada.....	1,980	960	7,270	7,220	24,480
Total.....	1,646,800	2,017,630	1,768,980	1,881,730	1,922,080
AFRICA.					
Egypt.....	82,780	117,870	57,850	125,080	70,560
South and East Africa.....	24,950	10,670	2,330	1,760	2,880
Total.....	107,730	128,540	60,180	126,840	73,440
OCEANIA.					
Australia and New Zealand.....	189,950	121,200	165,880	113,900	192,100
Philippines.....	27,170	32,500	21,630	7,560	7,180
Total.....	217,120	153,700	187,510	121,460	199,280

522 RESOURCES, INDUSTRIES, AND TRADE OF BRITISH INDIA.

Countries.	1909-10	1910-11	1911-12	1912-13	1913-14
ASIA.					
Japan.....	\$2,080,700	\$2,039,670	\$2,558,920	\$3,522,300	\$3,400,680
China.....	1,137,310	1,105,660	1,381,980	1,772,710	1,820,750
Straits Settlements.....	3,007,020	2,776,160	2,692,160	2,088,150	2,639,020
Netherland East Indies.....	1,464,140	1,411,740	1,586,320	1,906,730	1,587,400
Aden.....	35,710	39,460	80,660	69,060	92,200
Ceylon.....	22,210	28,100	34,830	64,300	74,300
Turkey, Asiatic, and Persia.....	65,850	2,980	33,170	42,080	82,230
All other.....	40,390	5,990	9,300	31,440	38,820
Total.....	7,853,330	7,409,760	8,377,290	10,097,270	9,705,440
Total, all countries.....	35,295,850	34,885,720	37,903,510	45,002,250	51,913,610

PRINCIPAL IMPORTS.

Direct imports of merchandise, including Government stores, from foreign countries rose from \$45,366,640 in the year 1912-13 to \$52,417,400 in 1913-14. The principal increases were in cotton piece goods, \$1,850,570; woolen piece goods, \$537,250; iron and steel manufactures, \$1,165,120; machinery, \$505,350; provisions, \$653,390; and earthenware and porcelain, \$174,160.

These imports were the largest on record, notwithstanding the fact that during the year ended March 31, 1913, the highest previous record, that of the year 1908-9, was broken. During the three years following 1909 imports decreased on account of the overstocking of goods, but during the last two fiscal years imports took an upward tendency, with the result that at the close of the calendar year 1913 there were on hand large amounts of unsold goods. During January and February of 1914 a number of native piece goods firms went into liquidation, and the large European wholesale houses had large amounts of stocks thrown back on their hands. Failures of Native banks, tightness of money, and the wide-spread business depression throughout India, all affected local conditions.

The value of the principal articles imported by sea from foreign countries into the Province of Burma during the years ended March 31, 1913 and 1914, is shown in the following statement:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Candles.....	\$49,460	\$50,820	Metals, and manufactures of: Continued.		
Coal.....	227,880	169,450	Tin.....	\$5,180	\$13,710
Cotton, manufactures of:			Zinc (or spelter).....	61,100	66,840
Handkerchiefs and shawls.....	188,370	133,970	Oils.....	552,820	345,010
Piece goods.....	10,435,050	12,285,620	Provisions.....	2,971,700	3,625,090
Twist and yarn.....	1,551,440	916,750	Salt.....	474,230	460,660
Dyeing and tanning materials.....	46,360	66,460	Seeds.....	13,670	24,260
Earthenware and porcelain.....	450,870	625,030	Spices.....	175,440	177,730
Glass, and manufactures of.....	303,560	395,580	Sugar.....	2,116,740	1,940,910
Leather, and manufactures of.....	158,880	177,840	Silk, and manufactures of:		
Liquors:			Raw.....	1,020,080	791,770
Ale, beer, and porter....	744,140	816,170	Piece goods.....	2,247,260	1,986,570
Spirits.....	728,090	740,460	Wool, and manufactures of:		
Wines.....	81,570	81,360	Piece goods.....	582,870	1,120,120
All other.....	1,380	1,730	Shawls.....	294,500	237,310
Machinery and millwork....	1,058,330	1,563,680	Tobacco.....	464,830	643,130
Metals, and manufactures of:			Umbrellas.....	208,740	224,020
Brass.....	41,640	59,630	Wearing apparel.....	1,303,110	1,264,290
Copper.....	47,210	90,560	All other articles.....	12,990,670	16,247,580
Iron and steel.....	3,405,050	4,570,170	Government stores.....	364,390	503,700
			Total.....	45,366,640	\$52,417,400

IMPORTS FROM FOREIGN COUNTRIES.

Details of the import trade of British India with Germany, Austria-Hungary, Belgium, the Netherlands, France, and Italy for the official years 1912-13 and 1913-14 are given in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
GERMANY.					
Boots and shoes, not of leather.....	\$190	\$6,790	Apparel, n. e. s.	\$5,030	\$5,870
Biscuits.....	78,410	61,060	Boots and shoes, not of leather.....	27,100	33,500
Cotton, manufactures of:			Cotton, manufactures of:		
Blankets.....	289,210	550,310	Blankets.....	8,280	22,870
Handkerchiefs.....	55,830	42,600	Handkerchiefs.....	5,520	1,160
Hosiery.....	269,940	340,800	Hosiery.....	800	2,690
Piec goods—Colored.....	60,490	98,900	Piece goods, colored.....	27,000	21,970
Twist and yarn.....	6,640	680	Twist and yarn.....	75,910	19,790
All other.....	14,150	5,830	All other.....	2,280	6,870
Dairy products:			Cordage and rope.....	41,710	43,940
Butter (canned).....	2,630	4,560	Chinaware and crockery.....	5,840	4,050
Milk (canned).....	53,850	72,660	Electric fans, lamps, etc.....	1,480	4,380
Dyeing substances.....	28,220	40,190	Furniture (wooden).....	8,220	6,710
Earthenware: China and crockery.....	60,820	89,230	Glass and glassware:		
Electrical supplies:			Bangles.....	1,810	38,810
Fans and lamps.....	9,160	18,980	Lamps.....	14,580	14,440
Motors and dynamos.....	1,090	2,900	Sheet and plate.....		890
Glass and glassware:			Tableware.....	6,720	4,710
Bangles.....	90	7,820	All other.....	14,670	23,350
Bottles.....	8,760	5,600	Haberdashery.....	62,380	24,260
Lamps.....	21,030	22,760	Iron and steel, manufactures of:		
Sheet and plate.....	12,790	4,320	Hardware—		
Tableware.....	10,480	8,860	Domestic.....	2,100	4,190
All other.....	18,330	25,790	Enamelled ironware.....	227,110	202,980
Haberdashery.....	61,730	28,450	Lamps.....	35,040	30,270
Iron and steel, manufactures of:			Nails.....	9,220	44,200
Bars and channels.....	5,760	34,600	Safes.....	34,480	36,660
Hoop.....	7,700	16,400	All other.....	3,870	17,690
Sheets.....	10,270	24,770	Machinery.....	340	19,700
Steel, cast.....	22,580	33,250	All other.....	3,240	2,570
Building forms.....	4,760	27,750	Matches.....	1,900	6,140
Cutlery.....	62,300	82,510	Milk, canned.....	4,000	4,660
Hardware—			Musical instruments.....	11,700	11,330
Builders.....	5,870	15,470	Paper.....	18,490	14,330
Domestic.....	50,040	65,630	Stationery.....	23,080	22,510
Enamelled ironware.....	107,960	110,610	Sugar.....	18,890	11,300
Implements and tools.....	15,240	14,760	Wool, manufactures of:		
Lamps.....	43,950	74,470	Carpets and rugs.....	960	1,530
Safes.....	11,320	13,590	Piece goods.....	3,770	1,920
All other.....	32,080	63,840	Shawls.....	18,760	23,400
Machinery—			All other.....	3,460	720
Rice mills.....	97,880	178,800	All other articles.....	55,970	41,220
Sewing machines.....	33,170	34,920	Total.....	785,710	779,080
Steam engines.....		23,250			
All other.....	28,640	23,610	BELGIUM.		
Nails.....	63,330	57,100	Coke.....		32,870
All other.....	11,850	22,230	Cutlery.....	9,530	15,380
Matches.....	41,770	14,940	Dyes.....	17,590	13,620
Musical instruments.....		21,480	Earthenware.....	11,640	34,270
Oil, white mineral.....		29,830	Glass and glassware:		
Paper.....		52,890	Sheet and plate.....	41,310	68,670
Salt.....	189,380	170,540	Glassware (all kinds).....	20,520	23,020
Silk, manufactures of.....		20,640	Iron and steel, manufactures of:		
Spirits, wines, and malt liquors:		27,440	Angles.....	16,580	25,800
Beer.....	169,040	158,510	Bars and channels.....	164,350	238,350
Spirits.....	34,320	50,300	Beams and pillars.....	10,310	25,260
Stationery.....		11,970	Bolts and nuts.....	13,400	26,460
Sugar.....		1,510	Cast steel.....	10,620	13,900
Toys.....		14,720	Hardware.....	44,950	41,640
Wearing apparel, n. e. s.		26,940	Hoops.....	15,920	23,300
Wool, manufactures of:		37,770	Nails.....	34,960	37,470
Carpets and rugs.....	37,030	58,800	Pipes, cast.....	5,410	27,960
Piec goods.....	146,310	218,810	Railway material.....	12,470	30,830
Shawls.....	208,260	134,590	Sheets and plates.....	23,650	41,920
Yarn.....	41,220	53,490	Tubes.....	1,140	23,660
All other.....	5,970	12,440	All other.....	28,480	25,620
Wooden furniture.....		18,940	Zinc, manufactures of:		
All other articles.....		209,480	Oil, white mineral.....	45,290	43,130
Total.....	2,958,630	3,712,810	Paper.....	49,440	57,610
			Milk.....	25,250	41,330
			Tallow.....	43,220	38,490
				65,580	160,160

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14			
BELGIUM—continued.								
Cotton, manufactures of:			Brandy.....	\$227,400	\$234,110			
Blankets.....	\$116,240	\$330,050	Butter.....	19,100	16,360			
Colored piece goods.....	85,050	83,850	Cotton, manufactures of.....	1,020	15,260			
All other.....	59,490	14,320	Perfumery.....	28,340	41,890			
Woolen piece goods.....	11,270	41,430	Tiles.....	23,660	28,060			
Playing cards.....	20,610	18,560	Wines.....	36,640	30,550			
All other articles.....	204,920	1,179,520	Wool, manufactures of.....	14,340	26,200			
Total.....	1,209,190	2,778,490	All other articles.....	76,230	113,130			
THE NETHERLANDS.			Total.....	426,730	505,550			
Cotton, manufactures of:			ITALY.					
Blankets.....	202,260	328,990	Cotton, manufactures of: Colored piece goods.....	107,290	355,950			
Hosiery.....	18,550	17,750	Hats, caps, etc.....	27,130	54,330			
Piece goods:			Wool, manufactures of:					
Bleached.....	174,720	181,300	Carpets.....	70,210	87,590			
Colored.....	981,800	1,012,010	All other.....	2,880	31,390			
Twist and yarn.....	23,830	16,850	All other articles.....	33,810	34,330			
Dairy products:			Total.....	241,300	563,590			
Cheese.....	15,310	15,510	Grand total.....	7,314,850	10,386,510			
Milk.....	133,470	237,490						
Earthenware.....	23,490	28,490						
Woolen piece goods.....	42,830	109,920						
All other articles.....	76,030	97,890						
Total.....	1,693,290	2,045,990						

Imports from Switzerland amounted to only \$168,280, as compared with \$173,860 in 1912-13; the principal imports were cotton goods, \$107,490; haberdashery, \$26,160; and canned milk, \$5,400. Salt was the only import of any importance from Spain, the value of which was \$40,400, compared with \$36,040 in 1912-13. Portugal also supplied only one article of importance, canned sardines, which rose in value from \$144,450 in 1912-13 to \$341,160 in 1913-14. Sardines are consumed largely by the Burmese and Chinese inhabitants. In 1913-14 Sweden supplied matches, valued at \$32,930; and Denmark butter, valued at \$75,770. These countries supplied no other imports of any importance.

IMPORTS FROM UNITED STATES.

In order to compare the trade of the United States in articles enumerated in the preceding tables, the following items are selected from the list of imports into Burma from the United States in 1913-14:

Articles.	1913-14	Articles.	1913-14
Apparel, n. e. s.	\$5,270	Iron and steel, manufactures of—Contd.	
Boots and shoes, not of leather	20	Hardware—Continued.	
Biscuits (crackers)	20	Enamelled ironware.....	\$20
Cotton, manufactures of:		Implements and tools.....	56,060
Hosiery.....	1,310	Lamps.....	7,880
Piece goods—		Safety.....	320
Colored.....	60	All other.....	54,410
Unbleached drills.....	9,720	Machinery—	
Cordage and rope	440	Rice mills.....	1,440
Electrical supplies:		Sewing machines.....	450
Fans and lamps.....	50,900	Steam engines.....	18,050
Motors and dynamos.....	3,670	All other.....	218,770
Glass and glassware:		Nails.....	68,570
Bottles.....	500	Pipes, cast iron and steel.....	591,650
Lamps.....	860	Wire.....	80,200
Tableware.....	160	All other.....	33,900
All other.....	520	Milk, canned.....	3,320
Haberdashery	9,690	Musical instruments.....	1,080
Iron and steel, manufactures of:		Paper.....	7,630
Bars and channels.....	1,160	Spirits, wines, and malt liquors:	
Hoop.....	50	Beer.....	1,360
Sheet.....	11,720	Spirits.....	870
Steel, cast.....	1,690	Stationery.....	11,930
Cutlery.....	4,550	Toys.....	1,220
Hardware—		All other articles.....	644,440
Builders'	10,030	Total.....	1,897,000
Domestic	1,790		

IMPORTS FROM INDIA PROPER.

Imports of merchandise into Burma from the other Provinces of India by sea (Burma is not connected by rail with India proper) decreased from \$32,741,020 during the fiscal year ended March 31, 1913, to \$31,389,540 in 1914. This decline is accounted for chiefly by a decrease of \$1,341,880 in grain and pulse. During the preceding year grain and pulse valued at \$5,779,720 were imported from India proper. These imports consisted principally of speculative ventures in rice, considerable amounts of Bengal paddy having been shipped to Rangoon for milling, on account of the shortage in Burma. Cotton piece goods declined by \$323,840 and cotton twists and yarns by \$758,900, both of these decreases being due to the reaction against excessive imports in 1912-13. Cotton piece goods of foreign manufacture were imported from India proper to the value of \$399,700 during 1913-14. Practically all of the American cotton piece goods are imported into Burma from Bombay. It is estimated that American gray (unbleached) sheetings to the value of \$100,000 are annually consumed in Burma. These sales could be increased if American exporters would sell direct to the Rangoon wholesale houses.

Aside from the decline in grain and cotton goods, the imports into Burma from India proper showed a healthy increase, especially of tobacco, provisions, and jute gunny bags.

Unmanufactured tobacco from the other Provinces of India increased from 9,129,933 pounds to 18,595,122 pounds. This tobacco is used for the manufacture of the well-known Burma cheroot. Imports of Indian-made cigarettes rose from 55,035 pounds to 211,730 pounds.

Imports of provisions from India proper, consisting of dry meat, ghee, eggs, and butter, increased by 45 per cent during 1913-14.

The value of the principal articles imported by sea from Indian ports outside of Burma into the Province of Burma during the years ended March 31, 1913 and 1914, is shown in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Coal.....	\$1,796,850	\$1,942,080	Oils.....	\$1,413,130	\$1,020,350
Cotton, manufactures of:			Provisions.....	2,930,560	3,915,100
Handkerchiefs and shawls.....	11,460	11,000	Seeds.....	325,580	342,610
Piece goods.....	2,467,440	2,143,600	Spices.....	1,846,330	1,945,480
Twist and yarn.....	2,569,900	1,811,000	Sugar.....	164,980	224,960
Dyeing and tanning material.....	14,780	15,860	Silk, and manufactures of:		
Earthenware and porcelain.....	13,450	15,020	Raw.....	76,380	39,840
Glass, and manufactures of.....	49,480	54,830	Piece goods.....	29,460	22,150
Jute gunny bags.....	4,049,680	5,351,070	Piece goods.....	29,210	23,020
Leather, and manufactures of.....	118,520	151,180	Shawls.....	5,280	4,680
Liquors.....	33,530	45,110	Tobacco.....	1,513,640	2,614,280
Machinery and millwork.....	45,770	53,030	Umbrellas.....	266,850	396,260
Metals, and manufactures of:			Wearing apparel.....	259,910	263,480
Brass.....	195,920	224,550	All other articles.....	11,002,940	7,583,990
Copper.....	66,350	77,140	Government stores.....	1,303,990	878,120
Iron and steel.....	134,890	205,000	Total.....	32,741,020	31,389,540
Tin and zinc (or spelter).	3,730	6,750			

EXPORT-TRADE.

Exports of merchandise from Burma to foreign countries during the year ended March 31, 1914, decreased by \$15,644,660, while those

to Indian ports increased by \$16,895,280 over 1912-13. This diversion of exports from foreign countries to other Indian Provinces was due to poor crops in Bengal and the United Provinces. Burma was thus called on for large supplies of rice which during the preceding year had gone to foreign countries.

The values of the combined exports of staple articles to the other Indian Provinces and to foreign countries from the Province of Burma during the two years ended March 31, 1913 and 1914, are given in the following table:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Grain (all kinds).....	\$87,442,090	\$87,065,180	Tobacco.....	\$1,122,450	\$812,740
Petroleum products.....	16,470,750	17,629,710	Rubber, raw.....	538,450	536,910
Timber.....	7,650,120	7,123,930	Oil cake.....	477,270	701,080
Cotton, raw.....	2,842,510	2,913,980	Cutch (dyewood).....	476,810	455,040
Hides, raw.....	2,185,390	2,642,470	Total.....	121,272,050	121,802,240
Ores.....	2,066,210	1,921,200			

The following comparative statement shows the value of the principal articles exported by sea to foreign countries from the Province of Burma, during the years ended March 31, 1913 and 1914:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Candles.....	\$542,970	\$751,050	Paraffin.....	\$1,846,330	\$2,060,080
Cotton, raw.....	1,379,320	1,989,340	Benzine, gasoline, lubricating and fuel oil.....	668,170	694,190
Dyewoods: Cutch.....	330,730	285,620	Oil cake.....	477,270	701,080
Grain bran.....	3,066,490	2,099,130	Rubber, raw.....	538,450	536,910
Grain and pulse:			Spices.....	96,650	77,110
Grain and pulse.....	714,950	728,420	Tobacco (including cigars).....	645,610	698,130
Rice, unhusked.....	306,290	430,390	Teak.....	2,928,660	2,392,190
Rice, husked.....	73,824,470	57,203,120	All other.....	32,580	39,220
Hides, raw.....	2,063,000	2,552,640	All other articles.....	1,807,120	2,463,980
Horn and horn meal.....	55,810	53,000	Total.....	93,213,010	77,568,350
Jadestone.....	74,800	129,630			
Lac.....	100,690	65,910			
Metals and ores:					
Lead.....	509,550	284,530			
Tin.....	101,840	119,170			
Wolfram (tungsten).....	783,830	882,780			
All other.....	227,430	325,730			

The following statement shows the value of the principal articles exported to Indian ports (outside of Burma) from the Province of Burma during the years ended March 31, 1913 and 1914:

Articles.	1912-13	1913-14	Articles.	1912-13	1913-14
Candles.....	\$405,800	\$432,280	Oil, mineral:		
Cotton, raw.....	1,463,190	924,640	Kerosene.....	\$11,487,340	\$11,849,180
Dyewoods: Cutch.....	146,080	169,420	All other.....	1,448,550	1,758,040
Grain and pulse:			Paraffin.....	71,790	84,890
Grain and pulse.....	501,950	465,810	Spices.....	62,200	53,490
Rice, unhusked.....	1,851,960	6,306,110	Tobacco.....	476,840	114,610
Rice, husked.....	7,175,980	19,832,200	Teak.....	4,008,430	3,625,650
Hides, raw.....	122,390	89,830	All other.....	680,450	1,066,870
Lac.....	61,670	56,030	All other articles.....	1,680,990	1,756,210
Metals and ores:			Total.....	31,998,970	48,894,360
Tin.....	97,530	66,820			
All other.....	256,030	242,170			

The total coasting trade between the ports of Burma during the years ended March 31, 1913 and 1914, amounted to \$18,686,940 and \$18,706,660; but the actual value of merchandise carried between these ports is about one-half of the above amounts, as these figures cover both export and import of the same goods. The aggregate sea-borne trade of Burma, including the coasting trade, for these two years amounted, respectively, to \$246,429,150 and \$251,147,350.

DECLARED EXPORTS TO THE UNITED STATES.

The value of declared exports (excluding returned American goods) from Rangoon to the United States during the year ended December 31, 1914, was \$780,640, an increase of \$74,910 over 1913. Hides declined from \$334,800 in 1913 to \$334,260 in 1914, but had it not been for the shortage of vessels on account of the outbreak of the war, the exports of hides during 1914 would have shown a large increase. Although there were comparatively few shipments to the United States after the outbreak of the war, the exports of white paraffin wax increased from \$70,310 in 1913 to \$150,980 in 1914. Burma petroleum is very rich in wax, and the increased production of crude oil during the past few years has placed greater quantities of wax on the market.

For the first time Burma millet (Kaffir corn) was exported to the United States in noticeable quantities. The year 1914 opened with considerable shipments, amounting in all to \$145,330. Since the outbreak of the war, however, none has been sent.

Exports of teak shipboards advanced in value from \$17,880 in 1913 to \$85,280 in 1914, as a result of increased purchases of these boards for the United States Navy.

Returned American goods amounted in value to \$1,590, of which \$1,000 represented one shipment of oilcloth, returned because of its unsuitability for local conditions.

The following statement shows the declared value of the principal articles invoiced at Rangoon, Burma, for shipment to the United States during 1913 and 1914:

Articles.	1913	1914	Articles.	1913	1914	
TO UNITED STATES.						
Rice:			Benzine.....	\$213,730		
Paddy.....		\$1,240	Millet, unhulled.....		\$145,330	
Broken.....	\$3,530		Teak ship planking.....	17,880	85,280	
Uncleaned.....		2,750	Burmese curios.....	1,770	1,800	
Cutch.....	10,230	17,680	All other articles.....	4,690	1,760	
Lac:			Total.....	705,730	780,640	
Grain and button.....	40,050	31,250				
Shell.....	8,740	2,440	TO PHILIPPINE ISLANDS.			
Wax, mineral.....	70,310	150,980	Candles, wax.....	1,000	530	
Copper matte.....		5,870	Wax, mineral.....	19,350	50,460	
Hides and skins:			Total.....	20,350	50,990	
Buffalo, dry.....		3,390				
Calf, dry.....	1,490					
Cattle, dry.....	170,700	256,630				
Cattle, green or pickled....	162,610	74,240				

No invoices were certified for shipments to Hawaii and Porto Rico.

OPPORTUNITIES FOR AMERICAN TRADE.

During the last five years German imports increased from \$1,491,400 to \$3,712,810, while those from the United States advanced from \$1,644,820 to \$1,897,600. The principal reasons for the large increase in trade with certain European countries as compared with that of the United States in this market are:

Direct steamships ran monthly from Bremen to Rangoon. These direct steamers were of special value in developing the trade in salt, which was always shipped in bulk, as their freight rates on salt are said to have been lower than on the British steamers from Liverpool. All imports from the United States must be transshipped at Liverpool when shipped from the Atlantic coast, or at Hongkong when shipped from the Pacific coast. The increased freight rates and delays due to these transshipments places American goods at a disadvantage, which must be overcome either by superiority of products or by better discounts and more favorable terms.

Several well-established Continental firms, engaged in both the import and export trade in Rangoon, are of great assistance in the development of European trade, and, as all have their head offices or branches on the Continent, they can more easily arrange sales on long terms of credit. Continental manufacturers also maintain branches in Rangoon, which is of special value in the case of machinery, as it is difficult to sell this class of goods by catalogues. On the other hand, most American manufacturers and export houses are represented in Rangoon by either British, German, or Dutch firms, who naturally take more interest in pushing sales of the products of their own countries.

IMPORTERS SHOULD HAVE AGENTS IN BURMA.

Frequent complaints have been made by large import houses that American manufacturers seldom grant sole agencies, and that when they do they do not protect their foreign agents, but allow New York export houses to ship their products into the territory of these agents. This consulate was recently informed that sole agencies for certain American products, to cover all of British India, had been granted to British firms in Bombay. This is too large a territory for one firm to handle, especially as Bombay merchants do not send traveling salesmen to Burma. It is a five days' journey from Rangoon to Bombay. The only result of such agencies is to prevent sales in Burma. Burma is not a portion of India proper; its people, their habits, language, standard of living, and customs are totally distinct; and it is not connected by railways with India proper. It is a distinct unit and should be so treated in commercial dealings.

Few American products, with the exception of automobiles, are advertised in Burma. The local newspapers, however, are full of advertisements of British goods and, up to the outbreak of the war, of German-made articles. In order to succeed American manufacturers should assist their foreign agents by making allowances for advertising.

American manufacturers who are unable to send out traveling salesmen and who are attempting to sell their products by sending catalogues to this consulate or to local dealers should always send price lists and discount sheets. Prices should be in British or Indian cur-

rency, c. i. f. Rangoon, or at least f. o. b. vessel in port of shipment. Prices f. o. b. factory are useless. Approximately 95 per cent of the catalogues received at this consulate do not contain price lists, and many sales have been lost for this reason. Under present conditions it takes at least three months to get a reply to a letter from Rangoon to New York. In writing to local dealers detailed information, including prices and discounts, should be mentioned in the first letter, or sent to this consulate.

KARACHI.

[By Consul James Oliver Laing.]

The prosperity of the Karachi consular district depends largely on the quality and quantity of the agricultural products from Sind, the Punjab, Rajputana, Baluchistan, and the Northwest Frontier Provinces, all of which are in this district. When there are good crops of wheat, cotton, oilseeds, and other exportable agricultural products, there is a background of prosperity in Karachi and throughout the district, which is affected seriously only by some very uncommon and usually extraneous condition. Poor crops mean not only fewer exports, but a serious curtailment in orders for foreign goods, as is usually the case in a country that depends on a few industries only.

In addition to poor crops there was overimportation of piece goods, which caused severe stagnation; unwise overspeculation in various articles, particularly in cotton and sugar; and failure of about a dozen native banks that involved many native firms. But by the late spring of 1914, the extra stocks of piece goods had been so far absorbed by the retail trade that importing merchants were relieved, and the bad effects of overspeculation to a great degree passed away. The outlook for crops was good, the number of native bank failures decreased greatly, and the dawn of a greater degree of general prosperity was visible.

The war has caused great difficulty in securing sufficient supplies of the many standard American goods, already known in this market. The lack of these articles, however, seems to be a temporary check only, as new connections have opened new American business and, what is better in the long run, continued opportunities. In this district, the war has offered no "easy money," but there is a good opportunity to compete with those who heretofore have had the advantage of being on the ground first.

The best openings for American goods in the Karachi consular district are in the following lines: Piece goods, lamps and accessories, cheap safety matches, steel beams, angle iron, plates and sheets, small hand tools, patent medicines, toilet preparations, cement, and drugs.

MANUFACTURES OF COTTON AND WOOL.

Karachi imports large quantities of cotton piece goods for the up-country trade. In the case of piece goods it has been believed best to give both the direct foreign import and the coasting import, or goods brought to Karachi, after being landed previously at another Indian port, usually Bombay. In many articles mentioned in this report this coasting import is of little or no consequence, but in piece goods it should be taken into consideration.

The value of the total import of cotton piece goods in 1912-13 was \$22,198,537; in 1913-14 it was \$24,328,458. In the last decade the value of cotton piece goods imported into Karachi has increased 107 per cent. In the last five years the increase has been 120 per cent, and in the last two years 9 per cent. The stock of piece goods in Karachi at the end of March, 1914, was estimated at half a year's supply. This is much larger than it should be. Supply exceeded demand even before the war. There are no statistics at present in the piece-goods trade which give the import by countries. There is, however, a stiff fight here for the market.

In 1913-14 twist and yarn dropped rather badly. In T reds Swiss were found to be the cheapest. Shipments from Switzerland and Holland were relatively larger.

Mercerized yarn was in demand at the expense of silk. There was a drop in twist and yarn generally of 33 per cent. It is not believed that the market will rise very rapidly now, owing to the war.

In gray, white, and colored piece goods the import in 1913-14 was: Unbleached, 39,518,350 yards, valued at \$2,328,823; bleached, 217,727,981 yards, valued at \$11,114,128; colored, 156,148,659 yards, valued at \$9,632,155.

A rather prominent feature of the market was the way American Pepperell drills continued in popularity. The imports fell only 8 per cent in quantity and 8 per cent in value. Referring to American drills, the official Government annual report on imports and exports contains this sentence, which is rather remarkable, as these publications are very noncommittal as a rule: "The article seems to be in demand, particularly on the frontier. American cotton piece goods have a good name here and should take a goodly part of the demand created by the absence of Continental goods."

In colored goods, including prints, a feature of the market since the beginning of the Balkan trouble has been the advance of Italy in the local market to the loss of Continental firms. The Balkan market being impaired, quantities of cheap cottons were dumped into India. This injured Continental houses more than American houses.

There is a good chance for an increase in all sorts of American cotton-goods business here, especially as American goods are already introduced.

There is an opportunity also to push American trade in cotton towels, cotton blankets, and machine-made lace.

In woolen yarn the Germans and Austrians increased their business during recent years. Stocks now are large but prices rule relatively higher than in cotton yarns. Berlin wool and yarns were being imported right up to the war.

American shippers introducing a new mark or "chop" should be careful not to have it resemble a mark or "chop" already in this market. A recent decision of the highest court in the Sind Province was very sweeping in its result, and a mark not particularly closely resembling an established mark was suppressed and a perpetual injunction granted. The decision, if anything, leaned a little too strongly in favor of the old mark.

IRON AND STEEL GOODS.

The American shipper is behind in the market for iron and steel beams, angle iron, plates, and sheets. This is not on account of any

prejudice against American goods, but because British, Belgian, German, and Austrian shippers have made greater efforts and because houses from these countries are located in this district and naturally favor their own goods.

There is an impression here among native dealers that Belgian iron and steel, especially beams, last longer than those of British make, as they are believed to keep from rusting longer. There seems to be a prejudice in favor rather than against American metal beams, angle iron, plates, and sheets, and this opportunity should be taken advantage of in the United States.

In small hand tools the Continent has supplied the market except for a certain quantity from the United Kingdom. Hammers, nail pullers, saws, planes, screwdrivers, and other carpenter's and mason's tools are in demand. There is considerable building going on here. American saws will not sell in any quantities to the native, but steel squares, hammers, and stone mason's tools sell among native craftsmen.

There is a steady but not large sale of hand stone saws used to cut up blocks of stone for outside dressing in stone buildings. The Continent supplied a large part of these saws. Planes and saws can be sold to the white population for use about large business houses and in general use around bungalows. There is a spasmodic demand for small pumps also, but this demand is not great.

There should also be a demand for tile-making machinery. Germany and the United Kingdom have heretofore supplied the demand. Tile making is an important industry in this part of India as most of the bungalows and many offices use tile as roofing.

CHEMICALS AND TOILET ARTICLES—CEMENT.

Boric acid is now in great demand and the price has risen. The United States has supplied boric acid for many years in this market, but since the war cut off the Continental supply the article is scarce. Carbolic acid also should find a market to advantage. A considerable quantity is used in this district for disinfecting purposes. Much of the supply came formerly from Germany. Lavender extracts and lavender waters were also sent here from various places on the Continent, although a large part of this trade is already and has been for some time in English hands. Germicidal soaps have been sent here largely from Germany. There are other Continental antiseptic soaps on the market. This article is largely used in India and the trade can now be pushed to advantage.

Cement is much in demand here, as there is considerable building going on. In Government work bids are asked from local contractors of standing. Samples of cement for Government contractors are submitted to several tests, usually in a Bombay government laboratory. About 10 cubic feet of cement is required for the test and about 20 per cent of every consignment is submitted to test. The laboratory makes about 20 different tests.

OPTICAL AND PHOTOGRAPHIC SUPPLIES—ADVICE TO IMPORTERS.

It is early to know the effect of the war on the trade in photographic lenses. It happens that all the local houses laid in large stocks a few weeks before the war began. As cameras, especially the more expen-

sive ones, are luxuries, the sale has fallen off and the market is well if not over stocked. The same conditions exist in the field and opera glass trade here as exist in the trade in lenses. It is still too early to know what will happen and stocks are large.

In general, I should advise American merchants to take bank references before entering into extensive business relations with merchants in the Karachi district. Cash against documents, Karachi, or cash in advance should be requested unless the American house is fully satisfied of the standing of the house in India. To get into this market is not a matter of a few weeks. Hard work and serious, well-directed, and sustained efforts are necessary to get America's share of the trade.

KARACHI'S DECLARED EXPORTS TO UNITED STATES.

Since the close of the calendar year 1914, there has been a tendency to increase exportation through Karachi to the United States.

It is too early to say what the outlook for increased importation to India from the United States will be, but the number of inquiries for American goods and the success of American traveling salesmen in this part of India indicates increased interest in American goods. Undoubtedly, new and valuable business connections have been made by American firms.

The chief decreases in exports to the United States in 1914 were in goatskins, sheepskins, and wool. This is perfectly natural under the circumstances, as skins form by far the largest item of export to the United States. The decline in goat and sheep skins in 1914 was \$348,962.

Exports of cotton to the United States were abnormally large, the figures being \$56,754, or \$52,680 more than in 1913. This was caused by the large operations of one firm, which sold heavily to American houses in the second quarter of the year when cotton was cheap in Karachi.

The declared value of the articles invoiced at the Karachi consulate for shipment to the United States in 1913 and 1914 is given in the following table:

Articles.	1913	1914	Articles.	1913	1914
Asafetida.....	\$1,880	\$1,752	Sheep casings.....	\$1,622	.....
Bone meal.....	9,015	.....	Skins:		
Bone sinews.....	21,518	48,726	Goat.....	1,161,263	\$1,125,276
Calfskins and rejections.....	7,522	69,729	Sheep.....	838,179	525,204
Carpets.....	1,627	.....	Wool.....	278,614	229,953
Cotton, raw.....	4,074	56,754	All other articles.....	1,734	3,644
Hides.....	166,287	197,697	Total.....	2,513,537	2,278,980
Hide fleshings.....	12,172	11,230			
Hide rejections.....	17,045	.....		

In general, it may be said that the trade through Karachi in 1914 was not as poor as was anticipated when the war began in August; and, now that routes are open, it bids fair to improve. There is, however, considerable stagnation in localities upcountry, on account of the low price of cotton, the increased cost of living, and the natural tendency to hoard capital and to refrain from undertaking financial responsibilities in disturbed times. Prospects in crops other than cotton seem to be good and the farming community should later do well with all kinds of food products.

AFGHANISTAN.¹

COMMERCE AND TRADE ROUTES.

Afghanistan, the buffer State between British India and Russia in Asia, with an area of about 250,000 square miles and a population of about 5,000,000 Mohammedans (no census has ever been taken), is, with the exception of Tibet, the largest closed country of the world. The strange anachronism is presented of a nation in the twentieth century which forbids the entrance of foreign missionaries either of religion or of commerce and which makes the profession of Christianity among its subjects punishable by death.

This State acts as a buffer both politically and commercially. Except for the gap across Afghanistan of about 500 miles between the railway termini at Kushkinski Post in Russian Turkestan and New Chaman in British Baluchistan, there would be connection between the railway systems of Europe and British India. Notwithstanding the tightly closed door into Afghanistan, trade with the outside world is increasing, important improvements are projected, and European and American ideas, fashions, and articles of commerce are invading the country.

RESTRICTIONS AGAINST ENTERING THE COUNTRY.

It is not possible for any citizen or subject of foreign nations to enter Afghanistan without a special permit, or firman, from the Ameer, who is the absolute ruler of the country. Moreover, no Europeans or Americans are permitted to cross the Afghan frontier from British India or Baluchistan without obtaining the permission of the British Government. The necessity of obtaining a permit from the British Government to cross into the country is based primarily on that Government's wish to avoid political difficulties with Afghanistan which might rise from the insecurities of travel or with other countries whose citizens might meet with personal danger by entering the country without sufficient special protection.

If any person particularly wishes to visit Afghanistan, he can get into the country only by interesting the Ameer in the object of his visit, which may be found difficult. No commercial traveler can get into Afghanistan unless the Ameer takes an interest in his particular business. Even then it would not be convenient or advantageous to undertake a trip into Afghanistan unless the Ameer would personally guarantee one's comfort and safety and provide a military escort to Kabul or Kandahar or wherever else it was desired to go. In fact, unless the Afghanistan Government itself assumed all expenses of such a trip and guaranteed a certain amount of profit-

¹ In the preparation of this report Consul Baker visited Afghan bazaars on the frontier at New Chaman in Baluchistan and at Peshawar in the Northwest Frontier Province and obtained information from business houses in Bombay and Karachi which have business dealings in Afghanistan. The report shows that there may be a market of a limited character for American goods in Afghanistan with the Government and the people and indicates the only possible method by which business may be accomplished.

able business it would probably never pay any American business or manufacturing firm to send a representative into the country, as the expense of travel and of transport of personal supplies would be so great as to offset any profits.

PROCEDURE FOR GAINING ADMITTANCE.

After application has been made to the Ameer for a permit to visit Afghanistan—and by having advanced some particularly potent argument the firman may be granted—the Deputy Secretary to the Government of India in the Foreign Department, if he deems it wise, will then grant permission to cross the frontier at the traveler's own risk. A regulation letter granting such permission to a representative of a business house in Bombay reads as follows:

With reference to your letter dated * * *, I am directed to inform you that the honorable the Chief Commissioner and Agent to the Governor General in the Northwest Frontier Province is being directed to allow Mr. * * *, of your firm, to cross the frontier, subject to the production by him of His Majesty the Ameer's firman and to the political agent in the Khyber Pass being satisfied that the Afghan Government has made arrangements for Mr. * * *'s escort and transport.

I am to add that the Government of India accepts no responsibility whatever in connection with the object of Mr. * * *'s journey to or stay in Afghanistan and that he proceeds there at his own risk.

AMERICANS IN AFGHANISTAN—EXPERIENCES OF ENGLISHMEN.

About the only instances in which Europeans or Americans have ever been allowed to travel into Afghanistan is when machinery or other articles have been required by the Ameer or his Government or special medical assistance needed at the court. At present there are understood to be six Europeans and two Americans residing in the country. Among the few European persons who have for any length of time sojourned in Afghanistan within recent years may be mentioned Mr. E. T. Thornton, who established a Government leather and boot and shoe factory at Kabul and wrote, in 1909, a book entitled "Leaves From an Afghan Scrapbook"; Dr. J. A. Gray, who was private physician to the late Ameer and wrote, in 1901, a book entitled "My Residence at the Court of the Ameer"; and Mrs. Kate Daly, physician to the Ameer's harem, who wrote, in 1905, a book entitled "Eight Years Among the Afghans."

The best authority concerning the frontier tribesmen of Afghanistan is the late Dr. T. L. Pennell, an English medical missionary, who recently died from blood poisoning contracted from a patient, after having written an interesting book entitled "Among the Wild Tribes of the Afghan Frontier." Dr. Pennell attained a remarkable reputation as a medical and surgical practitioner, and at his hospital at Bannu, on the frontier, in 1911, he treated 90,000 patients, who came to him from all over Afghanistan. The freedom and courage of his trips in the border hills at first excited the suspicions of the Afghan authorities, and at one time effort was made to limit his endeavors; but he soon gained their confidence and later their cordial esteem. The political value of his work as a pacifying agency was recognized by the Indian Government, as well as its beneficent nature, and in 1903 he was awarded the silver "Kaisar-i-Hind" medal for public service. Political considerations, however, still obliged him to

restrict his transfrontier travels to places within a short distance of the border, and his constant desire to visit Afghanistan and work in the closed land was never fulfilled.

Between the British military outposts and the Afghan military authorities relations are peaceable, but not socially friendly, mutual visits being forbidden by the Afghanistan Government. The same is said to be the case at the Russian Turkestan frontier. The colonel of the British regiment at New Chaman, about 2 miles from the Afghanistan boundary line, recently took a walk one morning across the boundary line into Afghanistan, and was surprised to find himself seized and held as a political prisoner. Only after several months of official correspondence between the capitals of Afghanistan and of India was his release effected.

SELLING AMERICAN GOODS THROUGH INDIA MERCHANTS.

Although it would be impracticable in most instances for representatives of American commercial and manufacturing interests to visit Afghanistan, it is quite possible for them to participate in the trade of the country, in such articles as are suitable, either by business negotiations with commercial agents of the Afghanistan Government at Bombay, Karachi, and Peshawar, or by direct introduction of their goods into the bazaars of towns in India adjacent to the Afghan frontier, located on trade routes into this country.

The Afghanistan Government itself, and His Majesty personally, frequently make large purchases of foreign goods. It is the practice in most instances for the Afghanistan Government to pay cash in advance when ordering goods, and the responsibility of the exporter ends with safe delivery of consignments to agents of the Afghanistan Government in India. The Government assumes subsequent responsibility for the safe transport of such goods into Afghanistan. The Ameer makes the most important purchases for his Government and himself through a special agent in Bombay, a leading Parsi merchant (Rustomji A. Dubash, Esq., care of Clubwalla & Co. (Ltd.), 17 Church Gate Street, Fort, Bombay). In conversation with this merchant as to possible openings in Afghanistan for American goods he mentioned that there should be a good market for longcloth shirtings for coats and pajamas mostly of cheap quality, steel bars one-fourth to three-eighths of an inch thick, chiefly for making nails for the Government boot and shoe factory at Kabul, lamp ware, fountain pens, various simple kinds of tools and hardware, barbed wire fencing and corrugated iron, garden implements, various supplies and novelties for palaces and for the upper classes, motor cars, cigars, cigarettes, etc. Also cast-off or secondhand uniforms from other countries meet with a remarkably good demand in Afghanistan; of all cast-off clothes imported into India, about 80 per cent go to Afghanistan.

PURCHASES OF THE MONARCH.

His Majesty the Ameer, Habibullah Khan, whose full title is Ameer of Afghanistan and its Dependencies, and Light of the Nation and of the Faith (age about 44), is much interested in flowers and in gardening, fishing and hunting, is a good photographer, and gives much time to this art, especially in enlarging pictures. He is also very fond of

sports and any new games especially appeal to him. It is said he has a liking for almost any kind of novelties, and will buy the most expensive articles if they meet his fancy.

The Ameer also takes a keen pleasure in motoring. He has 58 motor cars, of which 28 are Daimlers, 2 De Dions, 11 Albion, and the rest are of other makes. The Daimler cars are, 1 of 15 horsepower, 20 of 38 horsepower, and 7 of 57 horsepower. Recently he purchased about 15 motor lorries through the Bombay Motor Car Co. for use in carrying goods between Kabul and Peshawar, but on account of the unsatisfactory condition of the road near the Afghanistan side of the Khyber Pass their use was found impracticable. Improvements in this road are being made which will permit their use and also make it desirable to purchase more motor lorries of not more than 5 tons' capacity each. He also owns 50 elephants, and 4 state carriages which were presented by the late Queen Victoria.

His Majesty and all other persons at his court dress entirely in European costumes, except the headdress, which is of the Mohammedan pattern. They indulge in such amusements as golf, cricket, and polo. His Majesty uses some imported American roll-top desks and American typewriters in his palaces and Government offices, while American fountain pens are also used by him and leading court and Government officials. The average yearly importation of hardware ordered through the Bombay agent amounts to about \$22,000.

In deciding upon his purchases the Ameer is guided chiefly by illustrations from catalogues. His purchases are arranged chiefly through his court interpreter, Sirdar Azim-ula-Khan, Kabul, and executed chiefly through the Bombay agent of the Afghanistan Government, already mentioned, or if urgently required, through the Afghan postmaster at Peshawar, Mirza Gulam Hyder Khan.

ARMY SUPPLIES—FIREARMS PROHIBITED ENTRY.

A large part of the purchases of the Afghan Government are for military purposes. There is a standing army of nearly 100,000 men. The treaty of 1893 between the British Government and Afghanistan states:

Being fully satisfied of His Highness¹ good will to the British Government and wishing to see Afghanistan independent and strong, the Government of India will raise no objection to the purchase and import by His Highness of munitions of war, and they will themselves grant him some help in this respect.

The rifles imported for the Ameer's army are Lee Enfield's model No. 3 C, with special check bolts. Rifles and ammunition of an inferior kind, also army boots and belts and ammunition pouches, are made at a Government factory at Kabul. Through the Bombay agent an order had just been placed in England for 100,000 khaki suits for the Ameer's army. Except, however, for the Afghanistan Government itself, exports into Afghanistan of rifles and ammunition from either India or the Persian Gulf are forbidden by the British Government. Tribesmen in the country greatly desire to possess such imported articles, as tribal blood feuds, which are perhaps the greatest curse of the country, cause almost all the people to travel

¹ This treaty used the words "His Highness," but the Ameer is now always officially referred to as "His Majesty."

about with arms. Smuggled or stolen articles of such character are literally worth their weight in silver in Afghanistan, and efforts to obtain them by force or stealth in British territory necessitate constant vigilance by British military officials at the frontier.

IRON AND ELECTRICAL GOODS—AMERICAN CATALOGUES DESIRED.

Barbed wire is used extensively for defensive purposes all over the country, especially where there is danger from attacks by barbarous neighboring tribesmen. Even the grounds of the royal palaces at Kabul and Jellalabad are surrounded by barbed-wire fencing, which is usually supported by iron rods about 3 inches thick and 8 feet long. Corrugated iron roofing is used on all the Ameer's palaces and Government buildings and also on the residences of well-to-do classes.

There has also been considerable import of late into Afghanistan of steel and electrical supplies, especially in connection with a hydro-electric enterprise near Kabul. Steel 6-inch pipes are now used to bring water to Kabul from a distance of about 18 miles. The total value of goods purchased through the Bombay agent for the Afghanistan Government amounted in 1913 to \$350,000.

The Government of Afghanistan has a department at Kabul for filing catalogues of foreign manufactures under the card-index system. This department is under general management of the purchasing agent at Bombay, who mentioned to me that he would especially like to receive American catalogues of manufactured articles, such especially as may not yet be known to His Majesty or other leading people of the country. It was mentioned that good illustrations of articles offered for sale were the best means of attracting attention to them, especially as scarcely anyone in the country can read English.

The languages spoken in the country are Persian and Pushtoo (the latter being also largely spoken in northwestern India). The official court language is Persian, and the American typewriters in use at the court have Persian letters substituted for English characters. Such catalogues as may be readily available may occasionally result in large orders, as purchases are often rather suddenly prompted, and orders are often given for lines concerning which there is the most information readily at hand. It is not always possible to foresee the Ameer's wishes or requirements, but, when once expressed, the goods required must be obtained as quickly as possible.

THE BRITISH SUBSIDY—CASH IN ADVANCE BUSINESS TERMS.

The Ameer of Afghanistan receives from the Government of India an annual subsidy of about \$600,000, in accordance with the treaty of 1893, which states that such advances are given "in order to mark the sense of the friendly spirit in which His Majesty the Ameer has entered into these negotiations." Such subsidy is really given in order to enable needed improvements to be carried on in the country for military defense and for the better preservation of law and order within the country itself, in view of the fact that the Afghanistan Government's own revenues are hardly sufficient.

These large annual sums are chiefly used to pay for purchases of foreign supplies of all kinds, and when any article is purchased by the Government of Afghanistan it is usually debited against this

subsidy and paid for by checks from the Indian Government itself or by checks on Indian banks with which the residuum of such subsidies may be deposited to the credit of the Afghanistan Government. This arrangement greatly facilitates payment for goods imported.

Generally speaking, all business terms with Afghanistan should be cash in advance, this being always allowed by the Government of that country itself. It should also be the practice to take orders in writing, otherwise there is liable to be difficulty in obtaining payment for any goods supplied. Moreover, consignors should always be careful to obtain railway or shipping receipts for any goods dispatched to Indian destinations for ultimate shipment to Afghanistan. At these destinations consignors' responsibility should cease. This precaution is necessary, since later transport of such goods through Afghanistan itself is exposed to serious dangers of robbery, breakage, and depreciation through possible bad weather and rough handling while in transit through the difficult routes into the country. Owing to the hot, dry climate, wood in transit cracks easily.

MEMBERS OF THE COURT—THE SINGLE NEWSPAPER.

Among other high personages at the court in Kabul, besides His Majesty the Ameer himself, who make considerable use of imported articles may be mentioned the Ameer's brother, His Royal Highness Nasr-Ullah-Khan; the Crown Prince (about 29 years old), His Royal Highness Inayutallah Khan; another son of the Ameer, His Royal Highness Ana Doulat; and also their Royal Highnesses Hayat-Ullah and Omar Jan Sirdar Senara; also Her Majesty Ulya Hazarat Siraj-ul-Khwateen, Queen of Afghanistan and its dependencies, who is said to be the most advanced woman in Afghanistan.

AFGHAN MAIL SERVICE—THE POSTMASTER'S FUNCTIONS.

Afghanistan is not a member of the International Postal Union, so that the sending of letters or parcels to individuals in the country is attended with some uncertainty and inconvenience. Letters, etc., from all parts of the world have to be addressed care of the Afghan Postmaster, Peshawar, India, who forwards them to their respective destinations in Afghanistan. The postage for Afghanistan must either be deposited with the Afghan postmaster at Peshawar or else paid for by the recipients in Afghanistan. The Afghanistan postage amounts to 8 cents per letter, and for bulky packages larger amounts, according to weight. Letters are dispatched by runners twice a week; between Peshawar and Kabul, about 180 miles, they require three days for delivery. Newspapers, books, and other bulky packages and boxes are detained at the Afghan post office in Peshawar until they can conveniently be sent in batches on horseback.

The charges for horse hire for transport of goods between Peshawar and Kabul is about \$4 or half this amount for a half horseload, which charges are paid by the recipients. Similarly letters or parcels sent outside of Afghanistan are sent through the Afghan postmaster at Peshawar, and both Afghan and Indian stamps have to be affixed.

While in Peshawar, through the courtesy of the representative of an American oil company, I was introduced to the Afghan post-

master, Mirza Gulam Hyder Khan. This official has important powers and responsibilities not only in the dispatch of mails, etc., but also with regard to arrangements for transport of a great deal of bulky freight destined for the Government's use at Kabul, and he also acts as purchasing agent for his Government for articles urgently required.

VALUE OF AFGHAN COINS.

At this post office there is also considerable business in exchange of Indian and Afghan money. The coins of Afghanistan are of copper, silver, and gold, similar in name but less in value than Indian currency. The silver rupee is the unit, but there are a Kabuli rupee and a Kandahari rupee of different values. The actual exchange of Afghan rupees against Indian rupees is that the Kabuli rupee is about one-half the value of the Indian rupee and the Kandahari rupee slightly over one-quarter the value of the Indian rupee (one Indian rupee equals 32.44 cents American money). In levying duties in Afghanistan arbitrary values are given Kabuli and Kandahari rupees. The actual exchange value and the arbitrary values for levying duties are as follows:

Afghan rupees.	Indian currency.	United States currency.
	Rupees. Annas. Pies.	
¹ Kabuli:		
Actual exchange.....	0 7 9	\$0.157
Arbitrary value for levying duties.....	0 13 4	.27
¹ Kandahari:		
Actual exchange.....	0 4 6	.091
Arbitrary value for levying duties.....	0 8 0	.162

Formerly all the Afghan coins were hand minted and some of these were shown me at the Peshawar post office, but now they are well minted at Kabul, the late Ameer, Abdur Rahman, having introduced minting machinery and having obtained from the Government of India the services of Mr. McDermot, employed in the Calcutta mint, under whose supervision Kabuli workmen learned to cut the dies, erect the stamps, and strike off the coins. Since the accession of the present Ameer, the Afghan coins bear in Arabic characters the following: "Ameer Habib-Ullah Khan, Ameer of Kabul, The Seeker of God's help." The engraving on the obverse represents a mosque, with pulpit and minarets, encircled by rifles, standards, swords, and cannon.

CHEAP GOODS FOR THE MASSES.

While His Majesty the Ameer himself and the Government of Afghanistan, as well as leading Government officials and members of the nobility of the country, make rather generous purchases of imported articles every year, in which price considerations are not always uppermost, yet for the mass of people in the country the only articles which are purchased from outside Afghanistan are of a simple nature, bought at the lowest possible prices. As will be noticed by inspection of Afghan shops on the frontier, cheap German and Austrian goods are much in evidence, even more so than British goods which might presumably have the best chance here.

With the exception of American hurricane lanterns, which seem to have become popular in Afghanistan, and American kerosene oil, also a few cheap locks, watches, and clocks, I did not notice any American articles being sold at any of the frontier bazaars. American sewing machines, however, have an important use at tailoring shops. The principal imports into the country include cotton piece goods, twist, and yarn, second-hand apparel, manufactured leather, metals and manufactured metals, chiefly iron, copper, and brass, especially tools, cooking utensils, corrugated iron, iron bars, tacks, and nails; also tea, sugar, and salt. The importation and wholesale trade in such articles with Afghan or Indian merchants at the frontier are mostly conducted through Karachi or branch agencies of Karachi firms on the frontier.

LACK OF TRADE STATISTICS.

As the Afghanistan Government itself keeps no statistical records of outside trade and makes public no official reports of any sort, any understanding of the actual value and details of such trade can be gained only by reference to the official external land reports of neighboring British Provinces, which include British Baluchistan, the Indian Punjab Province, through which trade passes chiefly with southern and western Afghanistan, and the Northwest Frontier Province of India, which carries on trade especially with northern and eastern Afghanistan, chiefly through the Khyber Pass route to Kabul. An indefinite but probably small proportion of this Khyber Pass trade includes goods transshipped across Afghanistan north of the Oxus River to the Khanate of Bokhara, the Province of Samarkand, and the districts of Tashkend and Merv, in Russian protected country. These most recent reports all show increasing trade which has been due, it is explained, to greater prosperity and higher standards of living in both Afghanistan and India.

IMPORTS AND EXPORTS VIA BALUCHISTAN.

The complete total of all articles of merchandise, exclusive of treasure, exported from Baluchistan into southern and western Afghanistan amounted during the Indian official year 1912-13 to \$2,557,929. Among the most important exports included in these returns and their values were: Indian piece goods, \$342,838; foreign piece goods, \$1,258,101; apparel, \$1,996; Indian twist and yarn, \$2,096; drugs and medicines, \$29,992; gunny bags and cloth, \$34,718; manufactured leather, \$183,441; unmanufactured leather, \$18,594; iron goods, \$79,300; other metals, \$24,696; petroleum, \$4,420; other kinds of oil, \$21,680; refined sugar, \$166,431; unrefined sugar, \$8,439; Indian green tea, \$36,323; and tobacco, \$10,375.

The total of all kinds of merchandise exported from southern and western Afghanistan into Baluchistan amounted during the official year 1912-13 to \$2,524,568. The chief exports included fruits and nuts to the value of \$635,644; raw wool, \$1,500,846; spices, \$23,495; tobacco, \$15,850; ghee (clarified butter), \$15,690; hides of cattle, \$5,689; skins of sheep, goats, and small animals, \$6,220; horses, ponies, and mules, \$4,450.

THE BORDER CITIES.

The cities of Quetta, New Chaman, and Nushki, the last two close to the Afghan boundary line, are the chief centers in Baluchistan for this Afghanistan trade. Trade with western Afghanistan goes mostly through Nushki. These towns are on Baluchistan extensions of the Northwestern Railway system of India. A rebate to the extent of two-thirds of the actual freight charges is granted by the Northwestern Railway (owned by the Imperial Government of India) on all goods passing into Baluchistan and destined for either Afghanistan or Persia. This is intended to encourage this transfrontier trade from Baluchistan. The town of New Chaman is only 2 miles from the boundary line of Afghanistan, and the city of Kandahar (population about 80,000), the second city in size and importance in Afghanistan, is only 65 miles away, over what is understood to be a fairly good road. From the heights above New Chaman the city of Kandahar is visible on a clear day.

New Chaman is an important British military post. There is kept in stock here for immediate use in case of military emergency over 80 miles of track and other railway equipment, so that a complete railway line to Kandahar could be laid with great speed should circumstances so require. New Chaman is under martial law at all times, and persons are not permitted to walk the streets at night without a lantern and a countersign. This is necessary on account of the frequent murders and robberies of arms and ammunition. There is no hotel here, but there is a good railway "dak bungalow." Through the courtesy of the military authorities, who provided me with a military escort, I drove from New Chaman to the boundary post, which lies in a plain halfway between the British and Afghan forts, each about a mile away, and also walked a few feet into Afghanistan territory, the only chance I have had of being within the actual confines of this closed, forbidden country, which, nevertheless, it has been my purpose to investigate commercially as thoroughly as the difficult circumstances would permit.

TRAFFIC VIA THE PUNJAB AND THE KHYBER PASS.

There is a lesser amount of trade with southern and western Afghanistan from the western border of the Indian Punjab Province. The grand total of exports from the Punjab into southern and western Afghanistan in 1912-13 amounted to \$22,356, and the grand total of imports into the province from the same districts of Afghanistan during the same year amounted to \$15,430.

According to the last External Land Trade Report of the Northwest Frontier Province for 1911-12, the exports into northern and eastern Afghanistan, chiefly through the Peshawar-Kabul trade route through the Khyber Pass, amounted that year to \$2,208,332, and into southern and western Afghanistan to \$21,997. Among the most important exports, with values, may be mentioned: Cotton piece goods, \$771,788; raw cotton, \$3,100; European twists and yarns, \$3,100; Indian twists and yarns, \$5,025; leather goods, \$78,966; manufactured iron, \$62,412; brass and copper metal manufactures, \$73,983; stationery, \$3,314; glass, chiefly including beads and false pearls, \$1,648; apparel (largely second-hand clothing), \$45,495; drugs

and medicines, \$2,456; manufactured silk, \$2,773; petroleum, \$14,544; other kinds of oils, \$2,480.

The total imports into India over this route for the same year amounted in value to \$1,033,419 from northern and eastern Afghanistan, and to \$34,653 from southern and western Afghanistan.

THE KABUL MARKET.

The city of Kabul, with an estimated population of about 180,000, is the most important market of Afghanistan; it exports chiefly sheep and goats, fruit, nuts and vegetables, asafetida and other drugs, hides and skins, mats, ghee (clarified butter), silk, and wool. The trade has greatly increased since 1901, when the severe restrictions imposed on it by the late Ameer, Abdur Rahman, were partially removed. Bokhara supplies through this trans-Afghan route chiefly gold coins, gold and silver thread and lace, principally for reexportation to Kashmir, whence the return trade is shawls. Recent British frontier trade reports mention that trade with Bokhara, once important and lucrative, has steadily declined under the double system of transit and customs dues levied by the Ameer of Afghanistan and Russia, which has included Bokhara in its customs system. Much of this trade with Central Asia is now being diverted to the Batum-Bombay sea route.

THE KHYBER GATEWAY.

Khyber Pass, from the time of Alexander the Great, has been noted as the great military and trade gateway into India from the Asiatic countries to the west. The pass begins near Jamrud in India, 10½ miles west of Peshawar, and twists through the hills for about 33 miles in a northwesterly direction until it debouches at Dakka, in Afghanistan. The most important points en route are Ali Masjid, a village and fort 10½ miles from Jamrud; Landi Kotal, the summit of the pass, 10 miles farther; and Tor Kham, at which point the pass enters Afghan territory, about 6 miles beyond Landi Kotal.

The plains of Peshawar district stretch from the eastern mouth of the pass, and those of Jellalabad, in Afghanistan, from the western. The entire distance between Peshawar and Kabul is about 180 miles. The pass is strongly fortified by the British Government, and ordinary visitors who may wish to view it can only do so by obtaining a permit from the Khyber political agent, and then they can go only as far as Ali Masjid. It is open for traffic on Tuesdays and Fridays of every week except during the very hot summer months, when it is open only on Fridays. This pass is under special guard by the Afridi tribesmen who inhabit the surrounding mountains and receive a special subsidy from the Government of India for the protection afforded. The trade is borne on camels or mules which travel in caravans, but during the extremely hot summer months, when the temperature over a good portion of this trade route is as high as 118 degrees in the shade, it is found that mules endure the heat and hard work much better than camels.

STEADY FLOW OF TRAFFIC—TRANSPORTATION FACILITIES.

On visiting this pass in August, early in the morning, I found one continuous stream of traffic toward Afghanistan, chiefly on backs of

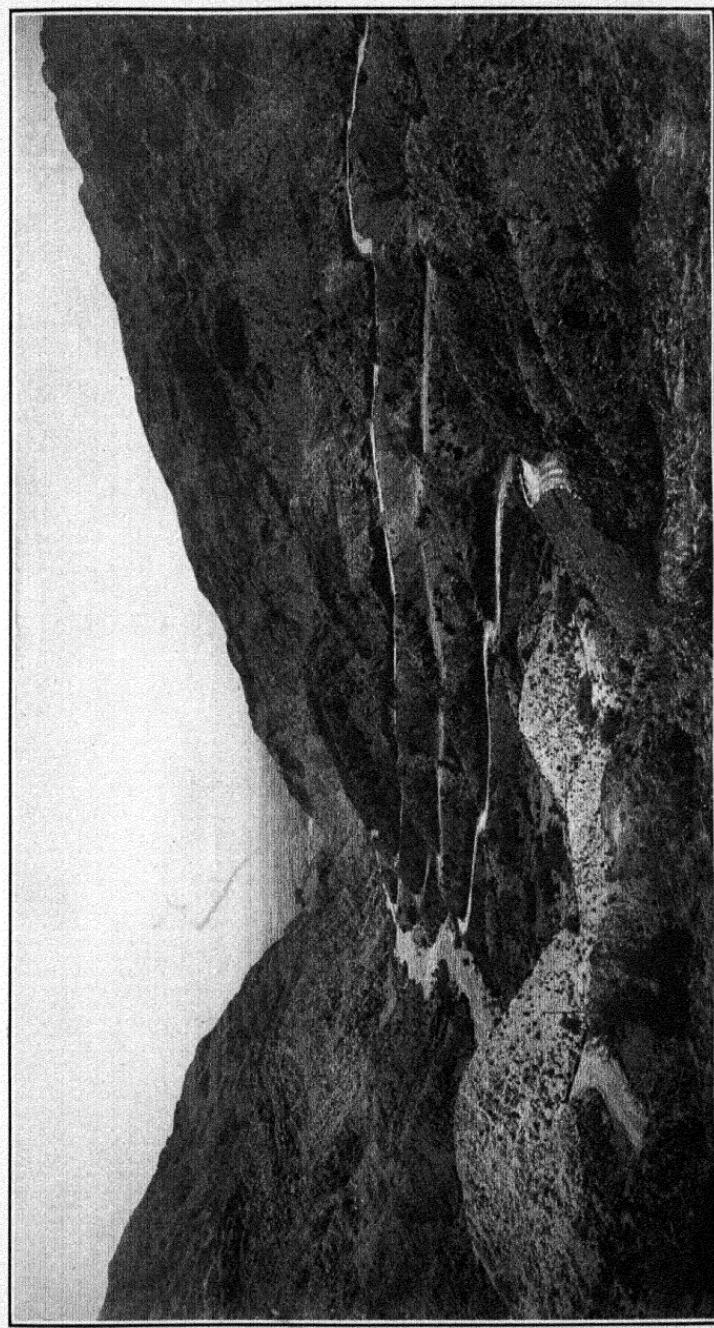


FIG. 21.—EXIT OF KHYBER PASS INTO PESHAWAR PLAINS.
(From National Geographic Magazine, Washington, D. C. Copyright 1914; all rights reserved.)

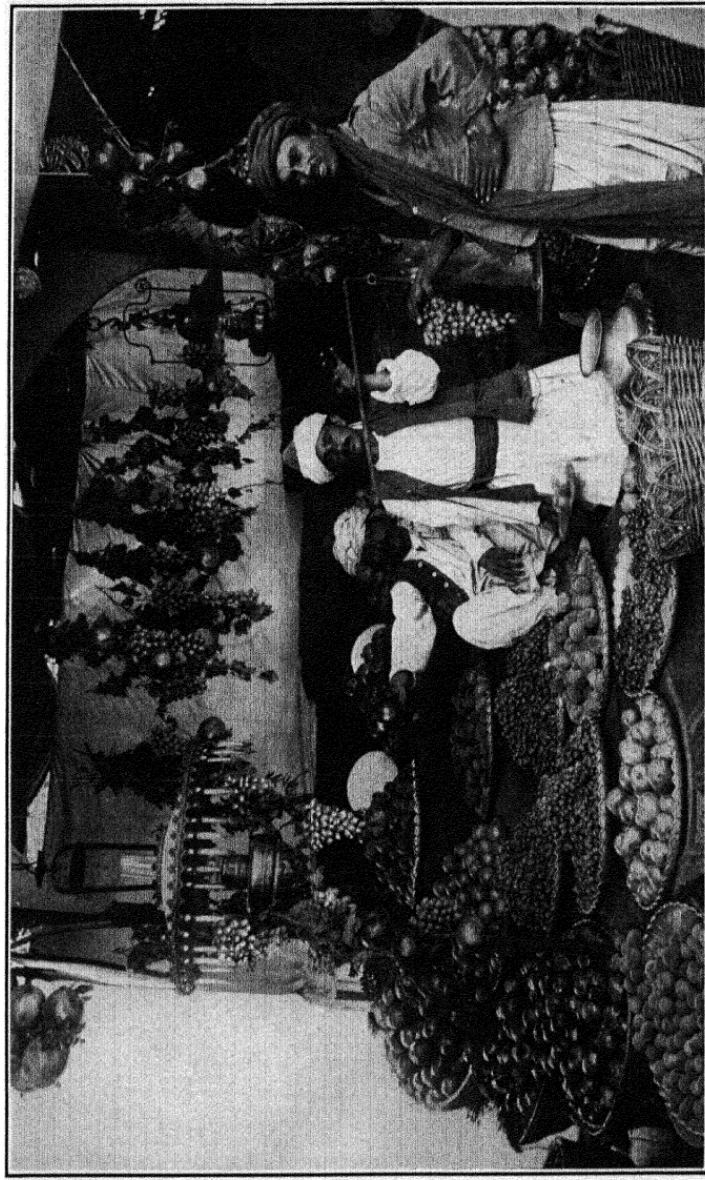


FIG. 22.—FRUIT STALL IN QUETTA, INGLE FRUIT MARKET, BALUCHISTAN.
(From National Geographic Magazine, Washington, D. C. Copyright 1914; all rights reserved.)

mules, but some camels were used. The ingenuity with which bulky goods were transported was remarkable, and sometimes the animal itself which bore the goods was almost hidden by the heavy load. Corrugated iron was carried in two pieces, forming a tall triangle on the backs of these animals. The morning hours are reserved for traffic into Afghanistan, and the afternoon hours for traffic the other way, and by evening all traffic is obliged by the military regulations to be well out of the pass. Just beyond the Afghanistan line the road is said to be most difficult, and sometimes in bad weather heavy loads may be stuck in the mud for some days. Elephants are much used on the Afghanistan side for transport of specially heavy loads, such as machinery. Under good conditions the best pack horses can not make the distance of 180 miles between Peshawar and Kabul in less than 7 days, and ordinary traffic usually requires about 14 days.

European or American travelers who may be permitted to visit Kabul usually require 15 to 20 pack horses to carry their goods, which must include not only clothing for warm and cold climates at the different elevations, but also tinned foods, and either a good supply of pure or aerated water or else filters and sterilizing apparatus for treating the bad water obtainable on the route. A great portion of Afghanistan is severely cold in winter. At Kabul, the capital, at about 6,000 feet elevation, there is often zero weather and 2 or 3 inches of snow. During the winter the Ameer and his court reside at Jellalabad, which is about 2,000 feet elevation. The climate of Jellalabad is warm enough to permit growing oranges and sugar cane, and is almost unbearably hot in summer.

THE AFGHAN-RUSSIAN TRADE

I have not been able to obtain any statistics as to Russian trade with Afghanistan, but in general it is understood to include such articles as broadcloth, fine linens and calicos, silk goods, velvet, chintzes, sewing thread and silk, gold and silver lace, gold and silver thread, needles, steel and copper wire, russia leather, paper, chinaware, glassware, cutlery, loaf sugar, pig iron, steel ingots, tin in plates, copper in plates, brass, quicksilver, cochineal, tea, honey, and white and yellow wax. Russian paper goods are said practically to monopolize the Afghanistan market. In silks, linens, and cottons Russian fabrics are said to be quite equal to those of Anglo-Indian manufacture which find their way into the country, Russian chintzes especially being more durable and of coarser texture than the Anglo-Indian article, although less elegant in appearance and of colors not so fast. They meet with a ready sale among the poorer classes. To meet the demands of the Kabul market, raw and spun silks are imported from Bokhara, but the bulk of either variety required by the Kabul looms comes from districts in Kabul Province. Velvets and satins are imported from both sides of the frontier.

THE RUSSIAN AND BRITISH AGREEMENT.

Russian goods enter Afghanistan chiefly through Herat, near to Kushkinski Post in Russian Turkestan, the terminus of the Nurghab Valley Railway, which connects with the Trans-Siberian

Railway into European Russia. The treaty signed between Russia and Great Britain in 1907 concerning Persia, Afghanistan, and Tibet, states that the British Government engages to exercise its influence in Afghanistan only in a pacific sense, and will not encourage Afghanistan to take any measures threatening Russia, while the Russian Government on its part recognizes that Afghanistan is outside the sphere of Russian influence, and that all political relations with this country shall be conducted through the intermediary of His Britannic Majesty's Government. Further, it engages not to send any agents into Afghanistan, though Russian and Afghan authorities may establish direct relations for the settlement of local questions of a nonpolitical character.

The British Government engages not to interfere in the internal administration of the country, provided that the Ameer fulfills the treaty engagements already contracted by him toward the British Government. Both countries affirmed their adherence to the principle of equality of commercial opportunity in Afghanistan.

For whatever diplomatic intercourse is required between Afghanistan and British India the Indian Government has political agents at Kabul and Kandahar, who, in accordance with treaty regulations, must always be Mohammedans, while the Afghan Government, on its part, maintains an agent at the capital of India.

CONSTRUCTION WORKS.

Interesting evidence as to the awakening of the closed country of Afghanistan to modern progressive ideals of civilization is to be found in important construction works now being carried out under circumstances of great difficulty, especially those connected with costly and difficult transport of needed machinery and other material.

The most interesting development of this sort is a project now under way for transmitting 44,000 volts of electrical energy from a waterfall about 120 feet high to Kabul, the capital, situated about 40 miles away. This development is in charge of an American engineer, Mr. A. C. Jewett, formerly an employee of the General Electric Co., Schenectady, N. Y., who was more recently chief engineer for the important hydroelectric development in the State of Kashmir, India.

ELECTRICITY FOR LIGHT AND POWER.

This hydroelectric scheme will cost between \$500,000 and \$600,000 when completed, about \$300,000 being for machinery and materials. The water power will be used for distributing cheap electrical energy to the gun factory, shoe factory, projected woolen mill, and other industries at Kabul, under control of the Government of the Ameer; also for electric lighting of the royal palace, other residences, and Government offices and street lighting. The machinery and material, including switches, generators, steel towers, and copper-covered steel wires, are being imported chiefly from the United States. The contract for this work is held by the Bombay firm of F. & C. Osler (Ltd.) (also of Broad Street, Birmingham, England).

The development should particularly benefit the industries of Kabul, which have been handicapped by the excessive cost of fuel. There are no coal mines in the country, and wood is scarce; for facto-

ries at Kabul wood has to be carried many miles on backs of camels. It costs His Majesty about \$100,000 a year for wood fuel for his factory.

The difficulty of transporting the machinery and ironwork through Khyber Pass and over almost impassable roads to Kabul is delaying the project, which may require several years to complete. The attempt to use motor lorries imported for this purpose failed, owing to the bad condition of the road to Kabul, and it is only by use of elephants that the heavy and bulky articles required can reach Kabul. Local labor, under the direction of the American engineer and two well-qualified assistants, is used.

THE WOOLEN MILL—LEATHER WORKING.

A large woolen mill is also being erected in Kabul, which it is intended to operate with cheap electric power. It has taken over five years merely to build the walls, owing to lack of local facilities for such work, and also the transport difficulty. The machinery has cost over \$80,000, while freight charges to Kabul have been nearly \$240,000. Three hospitals are also soon to be erected, the foundations having already been laid.

Among the factories and workshops now operating at Kabul are the boot and shoe factory, established in 1906, chiefly for making shoes for the Afghan Army. It is capable of turning out 400 pairs of army boots per day. Its establishment was under the supervision of Mr. Ernest Thornton, whose experiences in Afghanistan are described in "Leaves From an Afghan Scrapbook," published in 1910. All machinery for this factory had to be dragged up to Kabul on especially constructed carriages pulled by elephants. The following are also manufactured in this factory: Saddles, bridles, belts, carpets, pouches, portmanteaus, and mule trunks. The material is all imported. Efforts to market the products of this factory not required for military purposes have not been successful, owing to the relatively high cost (chiefly due to the expense of fuel) as compared with imported articles. Most of the imported boots, shoes, and saddles come from Cawnpore, India.

OTHER FACTORIES—INDUSTRIAL EDUCATION.

A fine ordnance factory and arsenal at Kabul, erected under supervision of Europeans has a capacity of about 25 rifles per day, and 2 large guns and 20,000 rounds of ammunition per week. These military manufacturing works occupy an extensive range of buildings outside the town on the banks of the Kabul River, where 1,500 natives, under the superintendence of 100 Indian Mohammedan artificers, who have been trained in the factories and workshops of India, are daily employed. The mint, with a possible output of 20,000 coins per day; the tanning yards; the candle factory, where 100,000 candles can be turned out weekly; and the soap works, where 10 tons of soap can be made in the same period, are all located in buildings adjoining the ordnance compound. The Government also has at Kabul several steam saw plants, which do good carved work for cabinets and chairs. There are altogether three woodworking factories in Afghanistan, the largest being in Jellalabad. There are

also Government workshops at Kabul for making brass ware, tinware, teapots, daggers, and sword handles.

The Government factories and workshops at Kabul have as their partial object public education in mechanical methods and appliances, and as a feature classes are organized in different industrial lines. For instance, the Kabuli tailors have classes for their instruction in the art of cutting. The Ameer frequently offers prizes of considerable value for the best or most original work produced.

BUILDING CONSTRUCTION.

Most of the ordinary houses of Afghanistan are constructed of sun-baked mud bricks. The ordinary building method is to fix firmly in the ground some poles, on which a complete wooden skeleton of walls, doorways, ceilings, and roof is formed. The wall interstices are then filled with sun-baked mud bricks. Upon the poles placed as rafters long rush mats are spread, and over them about 6 inches of mud is smoothly laid, forming a roof, into which sundry bits of hollowed wood are fixed for rain spouts. The walls, both inside and out, are carefully plastered down, chopped wheat straw being added to the mud, just as hair is used by an English bricklayer.

A rudely carved window frame, holding five sliding shutters, in which are two or three panes of precious glass from India, is inserted in the upper story. Afghan doors are crudely made in two divisions, or flaps, which are fastened by being cautiously brought together and hooked to a staple in the doorframe above by a piece of chain. Metal hinges are rare, but spikes of wood left jutting out of the doors at their inner corners, top and bottom, are stuck into holes and act as swivels. Paint is used only for Government work.

In walls of all dwelling rooms mud shelves are made. One runs around three sides of the room about 7 feet from the floor, like a massive frieze, and beneath it is a series of arched recesses, forming many smaller shelves, about 30 inches long by 5 inches wide. Afghans make their whitewash by grinding up a bluish stone found in the hills and mixing it with water and glue. This preparation is daubed on the walls with lumps of wool or rags, and dries quickly with a glazed surface.

Corrugated galvanized iron is used as roofing material on the Ameer's palaces, Government buildings, and the best private residences in Afghanistan.

HEATING AND BATHING FACILITIES.

The heating arrangements of Afghanistan houses are primitive and hardly sufficient to provide comfortable warmth during the cold winters, especially at Kabul, 6,700 feet above sea level, and other more elevated districts. The chief method of heating is by charcoal braziers, known as sandalis. An iron pot or brazier is placed in the middle of the room and filled with glowing charcoal. Among poorer people simply a shallow hole is scraped in the earth of the floor, and in this the charcoal is put. A large wooden stool is placed over the charcoal and covered by a large cotton-wool quilt, or rezai. The people sit on the ground around the sandalis, pulling the quilt up to their chins. A big "postin" over the shoulders keeps the back warm, and the turban is always kept on the head.

In winter not much work is done, and the people sit by the sandalis most of the day.

All the larger houses have rooms for the Afghan bath, somewhat like a Turkish bath, except that the heat is not so great. The walls are cemented and the floor either cemented or paved with an inferior marble that is plentiful near Kabul. The cement is made of equal parts of wood ashes and lime moistened and beaten together for some days. In a recess in one wall is a cistern or tank of stone or cement, with a fireplace beneath it, which is fed from the stokehole outside the bathroom. Public bathrooms are quite an institution in Afghanistan. They are rented by a bathman or barber, who makes what he can out of them. Some of the bathhouses belong to the Ameer.

PROSPECTS FOR MODERN HOUSEHOLD FACILITIES.

It is probable that with the completion of the hydroelectric enterprise there will be a demand for the equipment of the better class of residences at Kabul with electrical stoves and other heating appliances.

The timber chiefly used in the country for house building, etc., is called Chinar (a sort of teak). There are also some fine oak trees and pine timber in parts of the country.

PROPOSED TELEPHONE SCHEME IN AFGHANISTAN.

There are rumors on the Indian border of Afghanistan that the Ameer has contracted with a European engineer for a complete telephone installation between Kabul, Kandahar, and Herat, at a cost of about \$100,000. The best information obtainable is that while it is seriously contemplated by the Ameer, and while there have been negotiations with a London-Bombay firm, no contract has been executed nor work commenced. The political agent of the Afghanistan Government at Simla appears to be uninformed of the project.

The only telephone communication in Afghanistan is between the city of Jellalabad and the capital at Kabul, a distance of 100 miles. This is a private line belonging to the Ameer and connects his summer palaces at Kabul with his winter residence at Jellalabad. For some time there has been talk of the Ameer's considering the installation of a Marconi wireless system of communication between Kabul and Kandahar.

The three cities of Kabul, Kandahar, and Herat would, if connected with telephone wires, form points of a triangle, of which two sides, about 300 miles each between Kabul and Kandahar and Kandahar and Herat, would be about equal, while a third side, between Kabul and Herat, would be 400 miles. The 300 miles of line from Kabul to Kandahar would have a direction due southwest and from Kandahar to Herat due northwest, while the line from Herat to Kabul would be exactly west to east. Such a telephone system would place Kabul and Jellalabad, the residences of the Ameer, in immediate communication whenever desired with the frontier of Afghanistan on Baluchistan through Kandahar, and with the frontier close to Persia and to Turkestan near Herat. Kabul is supposed to have a population of about 180,000, Kandahar about 80,000, and Herat about 20,000, though no census has been taken.

IMPORTED FASHIONS AND ARTICLES OF TRADE.

In no way has the introduction of foreign ideas into Afghanistan been more marked of late than in the setting of European fashions of dress for the country by the royal court and nobility at Kabul. With the exception of hats, the costume at court, and in fact of all the leading people in Afghanistan, is entirely European, for both ladies and gentlemen. European collars, shirts, boots, and shoes, short stockings, and corsets are imported extensively for the upper classes, chiefly from India and England. Almost everyone in the country now wears at least some kind of boots or shoes. The corsets worn by the upper class ladies are short, comfortable, and cheap.

A representative of a leading Bombay tailoring house early this year visited Kabul at the invitation of the Ameer, and about \$30,000 worth of high-class apparel was sold to both gentlemen and ladies of the court. The ladies of the court were not permitted to be seen personally or measured for their garments, but their measurements were sent out to the tailoring firm's representative, who thereupon arranged for executing the orders. The ladies selected their new dresses from pictures submitted of the latest Parisian fashions. After the new costumes were all supplied, His Majesty gave a garden party to a large number of the ladies of his zenana (harem), at which the attractive new dress creations were displayed; this social function, however, was screened off by a long canvas partition from the observation of outsiders.

COURT COSTUME—JEWELRY RESTRICTIONS—WRIST WATCHES.

Regulation court costume at Kabul comprises a black cloth coat, vest, and trousers, circular astrakhan hat, and a white collar with black necktie. Anyone who wishes to attend at the palace or to be present at a durbar must wear this dress, which is cut to a special pattern. Military officers wear their uniforms. On state occasions the Ameer himself is resplendent in a scarlet coat richly embroidered with gold lace, white cloth trousers, and white gloves. For head gear he has an astrakhan hat decorated with a large diamond star, the costume being completed by a gold belt with jeweled buckle, sword, and gold shoulder straps surmounted by a diamond insignia.

In semistate dress the present Ameer, Habib-Ullah, wears a black uniform, faced with several lines of gold or silver braid and having deep astrakhan cuffs, with black cloth trousers, braided, and patent-leather knee boots. Sleeves, cap, sword, and shoulder straps are the same as in the full dress. At other times the Ameer wears the ordinary garb of an English gentleman. In furthering his views as to simplicity in personal costume, His Majesty has restricted the wearing of jewelry among men to signet rings, and prohibited altogether the gaudy silk handkerchiefs which it has been the fashion to display about the shoulders. Wrist watches are, however, much worn.

COSTUMES OF THE VARIOUS CLASSES.

The average man of the middle classes in Afghanistan wears tom-bons, or pajamas, gathered in at the waist and falling in tapering folds from the hip to the ankle, where they fit closely. The native shoes are worn without socks, unless the wearer is wealthy. An em-

broidered piran, or chemise, falls over the pajamas nearly to the knees, and a waistcoat, reaching a little below the waist, with long sleeves and a slit at the hip, is also affected. The costume is completed by a loose robe. The waistcoat is of velvet or cloth, quilted, and generally gold embroidered. The coat is of thin native cloth.

The Kabul man about town usually amplifies the native costume with European innovations; as a rule, the higher he rises in the social scale the more Europeanized becomes his costume. Nevertheless the readiness to follow certain European fashions depends solely upon the personal influence of the Ameer, although the custom prevails more generally in Kabul than in many parts of India.

The Afghanistan hillsmen, unaccustomed to town life, such, for instance, as those in charge of the trading caravans, wear a simple costume comprising chiefly a small unembroidered skullcap, a loose vest reaching to the knees and caught at the waist by the ample folds of a waistband or cummerbund, tucked within which there will be pistols and knives, and cotton drawers reaching only a little below the knees and very baggy. Around his shoulders there will be thrown carelessly heavy cotton shawls, usually blue, and for foot-gear there will be leather sandals with high-curving toes.

An ordinary poor man's dress includes a coolah, or pointed cap, around which, if he be not too poor, is wrapped a turban, one end of which is allowed to hang down on his shoulder and serves in turn as pocket handkerchief, purse, or dust veil. Then comes a calico shirt over bloomers of like material. A coat and curly-toed shoes complete his costume, which is distinctly airy for a place where the thermometer often registers 30 degrees.

AFGHAN HAT STYLES.

The Afghan cap shops are specially interesting features of the bazaars I have visited in the frontier towns of Baluchistan and the Northwest Frontier Province. In these shops are rows of small conical caps hanging on pegs and on bars across the top of the shop. An Afghan turban is wound around the cap, which is pushed on the back of the head. If put farther forward, the weight of the turban causes a painful pressure on the forehead. There are several different kinds of caps. The Kabul cap is thickly quilted with cotton wool. Inside, at the top, a little roll of paper inclosed in silk is sewn. This is supposed to have a sentence from the Koran written on it to protect the wearer from harm.

The best caps are embroidered all over with gold thread from Benares. Some are but little embroidered and have simply a star at the top, and others not at all. Some are made of velvet and some of cloth. Those from Turkestan are not quilted. They are not so heavy as the Kabul caps, are of very bright colors, and are worn indoors or at night. The caps are of all prices, from 5 cents to \$5 each, according to size and quality, but the Austrian-made are usually sold for about \$1.80 each. The lungis or turbans are also of many different kinds, the most common being cotton dyed blue with indigo—these are of native make—or of white cotton or muslin from India. A better kind is of blue or gray cotton, embroidered at the ends with gold thread, in wide or narrow bars, according to the price. These come from Peshawar. Natives of the better class use silk lungis,

and in colors of black, white, and brown, manufactured at Meshed, in Persia.

The Afghan ladies of the better classes are said to wear round caps worked all over with gold thread, so that they look like gold cloth, which are fitted closely to the back of the head. The hair, parted in the middle, is done up in tiny braids, which are caught in a black silk embroidered bag worn underneath the gold cap, but which hang down the bag to below the waist. Married women wear a fringe of hair, often curled, on either side of the face. Descending from the top of the head is a large wrapping of finest muslin, filmy gauze, or delicately tinted chiffon.

VEILED WOMEN—DOMESTIC GARMENTS FOR CHILDREN.

Poor women have merely cotton bloomers, slippers, and a cotton tunic. Out of doors Mohammedan women of all classes are closely veiled in a cotton cover, which consists of bloomers and burkah. The latter garment resembles a voluminous skirt, closely gathered in at the top and sewed on to a cap. In front of an Afghan woman's eyes is fixed a linen band, which has in it a few tiny squares of drawn threadwork, through which she sees.

The costumes of Afghan children are made chiefly by their mothers, who are usually expert needlewomen and often gifted with much artistic taste. In attending an afternoon tea at New Chaman, in Baluchistan, as the guest of an exiled relative of the Ameer, I had the privilege of seeing several young Afghan princesses, who were attractively dressed in bright costumes, mostly European in style, but with a large amount of gold and silver embroidered decorations, and artificial flowers especially, in their headgear.

POPULARITY OF CAST-OFF UNIFORMS.

A most curious feature of the apparel trade in Afghanistan is the extensive use of imported second-hand or cast-off uniforms from other countries, chiefly coats. These uniforms, which can be seen on Afghans even in towns on the Indian border, have been at one time worn by soldiers, policemen, postmen, railway men, etc., in England and other countries. I have heard of coats worn marked "Empire Theater, London," and of others with the names of foreign railways on them and the designation of the officer who originally wore the coat. In Angus Hamilton's Afghanistan, published in 1906, is mentioned in this connection the following interesting episode:

The staff of the frontier regiment on guard along the Afghan side of the border had accepted an invitation to the mess at the Russian post. They arrived in due course, appearing in all the full-dress grandeur of second-hand railway uniforms. The officer commanding the detachment exhibited on the collar of his tunic the mystic words "Ticket collector"; his subordinate, a subaltern, was content with the less exalted label of "Guard." Out of courtesy to their guests the Russians suppressed their merriment, receiving nevertheless the impression that a portion of the subsidy granted by the Government of India to the Ameer of Afghanistan was taken out in the cast-off uniforms of British public companies. The facts were that the Ameer, through his agent in India, had acquired a large parcel of discarded clothing at one of the annual sales of condemned stores in northern India.

In my inspection of the bazaars in India on the frontiers of Afghanistan I found such cast-off uniform coats selling for about \$1 to about

\$1.50 each. The special predilection in Afghanistan for wearing such uniforms is probably due to the general military ardor of the people. In Afghanistan every able-bodied man is considered a fighting man, and is subject any time to military service at the call of the Ameer.

FOOTWEAR OF THE PEOPLE.

Afghan shoes are ordinarily of heavy make, suitable for use in rocky, mountainous country where weather conditions are often severe. Sometimes these shoes, equipped with long, rounded nails on the soles, are used for skating or sliding over the ice. Most of the shoes are sewn with straps of leather and have the pointed toe turned upward. Some are elaborately embroidered with gold. The women's shoes or slippers are generally green and made with a high heel. They are almost sandals, having an upper only at the toe. Shoes or boots for the Ameer's army are made at the Government factory in Kabul, and some others used are also locally made, but many of the shoes worn for ordinary purposes are imported, chiefly from Cawnpore, India. Some of the Afghan nobility will pay as much as \$50 for a pair of fancy high-top boots.

CLOTHES FOR COLD WEATHER—ASTRAKHAN AND FURS.

The cold winter climate through a large portion of the country necessitates the use of warm apparel, so that there is a large sale of tunics, coats, and waistcoats, as well as boots and shoes of heavier material than used in most parts of India.

The kosae long coat is a feature of Afghanistan. It is made of raw woolen felt called namdah. The kosae coat is used by all nomadic tribes. The namdah is used as a carpet and is exported in large quantities to India.

There is quite a trade in astrakhan in Afghanistan, and also in furs. The Ameer has a monopoly of the astrakhan trade, and reserves for his own use and that of his court the best qualities. Astrakhan is much used to cover the round or straight sided Russian hats that Afghan military officers wear. Many varieties of furs are imported from Asiatic Russia, and a fair proportion is shipped across into India. Afghan fur dealers are rather clever in dyeing cheap furs of common domestic animals, especially rabbits and cats, to make them resemble furs of more valuable animals. There is an extensive use of local squirrel and red-fox furs. The most valuable fur coming from Russia, used only by wealthy people in Afghanistan, is sable.

TRADE-MARKS NECESSARY—FABRICS AND YARN.

In my study of the frontier bazaars catering to Afghan trade, two features were noticeable—i. e., the great cheapness of most articles offered for sale and the important use of trade-marks in selling such goods. This was especially true of cotton piece goods, which all had bright picture trade-marks attached, including illustrations of Afghan warriors, of the Ameer on horseback, the Crown Prince, etc. When customers buy piece goods they ask for the trade-mark they know, and not for the particular cloth it might be difficult for them to name. Cheapness is essential in order to bring such

goods within the means of the masses of people, who must pay heavy customs and octroi duties as well as charges for transportation by camels and mules. The chief articles I observed in these bazaars included cotton piece goods, apparel, including braided or embroidered coats and vests, peak caps, boots and shoes, lanterns, lamps and candles, cooking utensils and various other kinds of metal ware, and soaps.

Calicoes were found to sell for about 6 cents per yard, cotton drills for about \$6 per 50-yard piece, and white longcloth, which was in much greater evidence than any other kind of cloth, for about \$1.48 to \$3.60 per piece of 40 yards. Woolen fabrics dyed red, brown, green, etc., sold for about 14 to 33 cents per yard. White, green, red, and yellow yarns, Bombay made, sold for about 16 cents. Sewing thread in spools of about 150 yards sold for about 1 cent for three, and better qualities for about 1½ cents each. Cotton underwear sold for about 35 cents a piece, and umbrellas for about 35 to 40 cents each. Silver braid made in Germany sold in reels for about 75 cents per 50 yards, and gold braid for about \$1.35 for the same length. Second-hand regimental coats with brass buttons sold for about 40 cents apiece. Boots made in Cawnpore, mostly with the toes turned up, sold for about \$2 per pair, and children's shoes for about \$1.32. Peak caps sold for about \$1.80 each. The apparel sold at these shops is usually made up at the shops themselves on American sewing machines from the imported materials.

GENERAL MERCHANDISE.

Enameled teapots sold for about 25 to 35 cents each and teacups for about 25 cents per dozen. These are mostly of Austrian manufacture. Iron bread dishes of German manufacture and about 20 inches diameter sold for 16 cents each. They are usually supported on iron tripods, which sell for about 12 cents apiece. Galvanized iron buckets sold for about 16 to 40 cents each, according to size.

American hurricane lanterns were found to be an exceedingly popular selling line. Cheap English imitations of these hurricane lanterns were selling for about 60 to 75 cents each, and some crude German lamps were also sold for about 6 cents each. Burma candles were selling for 6 cents per packet containing 6 candles each. The candles used in Afghanistan are chiefly the imported Burma kind, and also some of the native manufacture on the dip pattern with cotton wicks. The poorer people use vegetable-oil lamps of clay, with or without handles, and with a spout; the cotton wick floats in the oil and extends a quarter of an inch beyond the spout, where it is lighted. Some lamps on the same principle are larger, elaborately made of brass, and hang by chains from the ceiling. They have four or five wicks. Others, with three or four wicks, are made of tinned iron and stand on the ground, supported by an upright about a foot high.

Considerable kerosene, as well as local vegetable oil, is sold in these shops. The sale of kerosene oil from the United States is steadily increasing, about 20,000 gallons being sold by the Standard Oil Co. for export through the Khyber Pass in 1912, while the exports for the first half of 1913 show a much larger amount relatively. The competition of kerosene with local seed oils is handicapped by the exces-

sive cost of transport. Case oil which costs about \$2.16 in Peshawar is sold for about double that price when delivered at Kabul.

IRON BARS AND BANDS—SOAP TRADE.

Iron bars, which are made into a variety of articles, sold at the bazaars for about \$3.50 per hundredweight (112 pounds) and galvanized sheets for about \$4 per hundredweight. As cotton piece goods arrive at these frontier towns in bales too heavy and cumbersome for transport into Afghanistan on camel or mule back, the bales therefore are broken up and the contents repacked in smaller amounts for more convenient transport. The iron bands around these bales, which, on piece goods from India, have usually been supplied from Pittsburgh, U. S. A., after being stripped off, are sold for many uses, such as for making knives, daggers, etc., and often to be fastened to supports around young trees to keep cattle away.

Judged from rather wide displays of cheap English soaps in these bazaars, selling for about 4 cents per small cake, the use of imported soap in Afghanistan is important. Besides the imported soaps, native soap in saucer-shaped lumps is sold. This is not used, I am told, for washing the hands and face, an Afghan, it appears, rarely using soap for such purposes, but for washing clothes or harness. It is rather alkaline and caustic. A soap factory has been established by the Government at Kabul, but its products are said to be in poor demand. Other soap in the form of tablets is imported from Russia and Austria.

TEA, SUGAR, AND TOBACCO.

A great deal of tea, sugar, and tobacco is sold in these frontier shops. The largely increasing export trade in green tea from India to Afghanistan is shown in the External Land Trade Reports of the Northwest Frontier Province for 1911–12, which mentions that the exports expanded from \$150,100 to \$208,616 during the year under review. The increase, it was suggested, was due to the cheapness of this green tea, which comes chiefly from Bombay, and is brought in from Peshawar through the Khyber Pass. Black tea is used in small, though increasing, quantities. Tea shops are important features of Afghan cities, and afternoon tea is a general custom. Sugar is sold in torpedo-shaped loaves, which I found quoted on the frontier at 25 cents for 3½-pound pieces, apparently all made in Austria-Hungary.

Afghan tobacco sells in these shops at 33 cents per 6-pound packet. Most Afghans are inveterate smokers. The tobacco they smoke grows near Kabul, Kandahar, Herat, and many other parts of Afghanistan, but the best comes from Persia and some from India. The Afghan leaf is pale, apparently uncured, not pressed nor cut, but simply broken up. The Ameer and officials of his court make extensive use of cigars and cigarettes of the best quality, but the people of the country as a whole use chiefly a cheap local tobacco which is chewed or smoked through a huka (a long Indian style of pipe). While in conversation with the commercial representative of the Afghanistan Government at Bombay I mentioned the present practice of many well-to-do American cigarette smokers, also of some leading clubs, of having special monograms printed on their ciga-

rettes, as well as on the boxes that contained them, and suggested that His Majesty the Ameer might like his own cigarettes in this attractive style. The commercial representative stated that this custom was as yet unknown at the Ameer's court, but that he would be glad to present this suggestion to His Majesty.

AMERICAN GRAND PIANOS.

There does not appear to be any important importation of European or American musical instruments into Afghanistan, but occasionally some American grand pianos, at great difficulty and expense, have crossed the border on large bullock carts. A music dealer mentioned to me one instance of this sort in which a grand piano was consigned to a leading Afghan nobleman, who, on its arrival, had all the lower part of it cut off, as he found it most convenient to play it while squatting on the floor.

PAPER PURCHASES.

The paper used in Afghanistan appears to be supplied almost solely from towns in Russian territory north of the Oxus River and is mostly foolscap size, of stout but inferior quality, and white or blue. There are two assortments, glazed and unglazed. The blue-glazed is preferred, the unglazed kind usually being cut into the required sizes at Kabul. There is said to be quite a trade in this commodity between Kabul and Kandahar. It is difficult to account for the Russian product having captured the market to the practical exclusion of all other brands. The paper needs to be stout to allow facility of erasure; on this account, and on account of the nature of the ink employed, glazed paper is most satisfactory.

DUTIES AND SPECIAL TAXES.

The duties on some of the leading articles imported into Afghanistan are 14 per cent ad valorem for cloth, 10 per cent for iron, 25 per cent for tea, 33½ per cent for sugar, 16½ per cent for oil, and 11 per cent for miscellaneous goods. Owing to the arbitrary exchange values as taken by the Afghan customs officials, the real duties amount to nearly double those thus given. There is no duty on goods for the personal use of the Ameer or for the Government of Afghanistan. On most classes of goods there are also octroi tolls and other special provincial taxes. Moreover, on each camel load going into the country there is also assessed a special tax of 60 cents and on each ass load 30 cents. There is said to be a great deal of smuggling of goods across the boundary line, especially from Baluchistan, where, the country being more open and routes not confined to narrow passes as the Khyber, it is easier to elude Afghan customs officials. Firms in India doing business with the Government and wealthier classes of Afghanistan charge far higher prices relatively than they do for customers in India, even though cash is paid in advance, this being because of the general difficulties connected with the business and the necessity of often paying special commissions or presents for securing such business.

SHEEP AND WOOL INDUSTRY.

A curious variety of fat-tailed sheep is native to Afghanistan. It is characterized by the immense weight and size of its tail, caused by development of masses of fat, forming stores of nourishment which are drawn upon during winter, when fodder is scarce. These sheep furnish the principal meat diet of the inhabitants, and the grease of the tail is a substitute for butter. The wool and skins not only provide material for warm apparel, but also furnish the country's main article of export. The raw wool exported by the Baluchistan route during the fiscal year 1912-13 amounted to \$1,500,846, and skins of sheep as well as of goats and other small animals during the same year amounted to \$6,220. The raw wool exported by the Khyber Pass route into the Northwest Frontier Province of India amounted during 1910-11, the last year for which statistics are available to \$51,670, and of manufactured woolen piece goods to \$11,300, and skins of sheep, goats, and small animals to \$52,774. This wool finds its eventual foreign export market at Karachi, in the Sind Province of India, which is the most natural entrepôt for the general foreign trade of both Afghanistan and Baluchistan.

FOREIGN BREEDS—USE OF THE FAT-TAILED SHEEP.

The Afghanistan wool is of good quality, except that the indiscriminate intermixing of black and white sheep and the wool of different grades of length and color tends very much to lower the export value. On account of the good quality of wool, the Afghanistan sheep are occasionally crossed with Indian sheep, and the wool of these half-breeds appears to be also of fine quality and long. It has not been found advantageous to introduce these Afghanistan sheep into India generally, as they seem especially subject to diseases which spread to other flocks. Large numbers of them, however, are in northern Baluchistan and also in the vicinity of Peshawar, in the Northwest Frontier Province. I was told while in Baluchistan that one leading flockowner had tried the experiment of introducing some merino sheep from Australia for crossbreeding with these fat-tailed sheep, but it was found that they would not mix. In the city of Peshawar I noticed these fat-tailed sheep kept even in private houses as a potential source of family meat and oil supply, as well as for profit to be derived from the sheepskins.

The fat in the tail is one of the most valuable portions of the animal, and is used largely as a grease substitute for ghee, or clarified butter, as used in India. It is because of the widespread local use of this sheep grease that Afghanistan is enabled to save most of the ghee it produces for export to India. The kidney fat of every sheep or goat slaughtered in Afghanistan is a Government perquisite, and is sent to the Ameer's soap manufactory, where it is made after the most economical principles into a kind of coarse soap.

PREPARATION OF SHEEPSKIN COATS.

The manufacture of sheepskin coats is one of the most important industries of Afghanistan. Of late years the trade has greatly increased, owing to demands for this article in India. The leather

is prepared and made up in Kandahar and Kabul on an extended scale, giving occupation to many hundreds of families. The dried, unshorn sheepskin is immersed in running water until it is soft and pliant, while the wool is thoroughly washed with soap. After this the fleece is combed and the skin stretched on a board, when the inside surface is smeared with a thin paste composed of equal parts of fine wheaten and rice flour, to which is added a small portion of finely powdered salt. This dressing is renewed daily for five or six days, throughout which time the pelt is exposed to the sun. Before the conclusion of this process the skin is again cleansed, washed, and dried, after which all superfluous growths are removed. The surface is then treated with a tanning mixture made of dried pomegranate rinds, powdered alum, red ocher, and sweet oil. After some days, when the requisite suppleness has been gained, this preparation is scraped off.

In the western districts a mixture of alum and white clay is used in preference to the pomegranate rinds. In such cases the skins, when cured, are white and somewhat coarser to the touch than those prepared with pomegranate rinds. In the Kabul process the pomegranate rind is used most freely. Before the tanning is completed the skins are handed over to tailors who reduce them to strips of 2 feet long by 4 or 5 inches wide, from which they make three varieties of coats. One class comprises small coats with short sleeves, and requires only two or three skins; another description reaches to the knees and is furnished with full sleeves fitting close to the arm. This takes five or six pelts. A third pattern forms a large, loose cloak of capacious dimensions, extending from head to heel and furnished with long sleeves, very wide above the elbow and very narrow below it; it also projects several inches beyond the tips of the fingers. These require 10 or 12 skins. Usually the edges and sleeves of the coats are embroidered with yellow silk. The completed articles cost from 35 cents to \$17, according to size and finish. The woolly side is worn next the body, except in exposure to rain, when it is reversed. The full-length coat is a very cumbersome dress and is usually worn only in the house; it serves alike for bed, bedding, or as a cloak.

There is also considerable manufacture in Afghanistan of woolen felts, which are largely exported to India, Persia, and the Russian trans-Oxus provinces.

AGRICULTURAL AND MINERAL RESOURCES.

Although the greater part of Afghanistan is more or less mountainous, and a good deal of the country is too dry and rocky for successful cultivation, there are many fertile plains and valleys, which with the occasional assistance of irrigation from small rivers or wells, yield satisfactory crops of fruit, vegetables, and cereals. The fruit industry is, next to that of sheep, the source of greatest wealth to the country. In certain districts fruit, both in its fresh and preserved condition, forms the staple diet of a large part of the population throughout the year. A rapidly growing export trade in fresh and dried fruit exists with India. In dried fruit, especially raisins, which find a good market all over India, and pistachio nuts, melons, and certain kinds of grapes noted for their keeping qualities, there is a big trade through the Khyber Pass, but most

fresh fruit is exported through Baluchistan, where transport between Kandahar (around which there are especially fine fruit gardens and orchards) and the Baluchistan railway terminus at New Chaman presents less difficulty. The value of the fruit and nuts exported through the Khyber Pass in 1911-12 amounted to \$471,728, and the value of such products exported through Baluchistan during 1912-13 amounted in value to \$635,644.

EXTENSIVE FRUIT PRODUCTION.

Fruit from Kandahar, together with that from Baluchistan itself, is marketed chiefly at New Chaman and at Quetta (the chief city of Baluchistan), and is sufficiently large in amount to have caused a special daily fruit train of about 15 cars each to be run from Quetta to different cities in India during August, September, and October. The most famous Afghanistan fruit includes a sweet melon, known as sarda,¹ which will easily keep in good condition for four or five months, small seedless grapes and dried raisins made from the same, pomegranates, pistachio nuts, and almonds. The sale of almonds, except through agents of the Ameer, is forbidden.

Fruit farming is divided between orchard fruit, with which vegetable farming is usually combined, and those fruits which may be grown in fields on a large scale. In the one class are apples, pears, almonds, peaches, apricots, plums, cherries, grapes, figs, quinces, pomegranates, and mulberries, in addition to walnuts, pistachio nuts, the edible pine, and rhubarb, which grow wild in the northern and eastern highlands. Vegetable produce, which also holds a high position in the export trade, includes most domestic vegetables; while of the uncultivated vegetable products the castor-oil plant, the mustard, sesame, and asafetida grow in great abundance. The fruit fields also produce several varieties of melons, including musk, water, and scented melons, and cucumbers and pumpkins.

CEREALS AND OTHER CROPS—AGRICULTURAL IMPLEMENTS.

In cereal production there are two harvests. One, reaped in summer, is from autumn sowing and includes wheat, barley, and certain varieties of peas and beans. The second harvest is gathered in autumn from spring sowing, and embraces rice, Indian corn, millet, arzun, and jowari, besides other grains of less importance. In addition, madder, tobacco, cotton, opium, hemp, clover, and lucerne are very generally cultivated. Clover and lucerne are produced for fodder, hemp for its intoxicating properties, and madder, tobacco, cotton, and opium for export. Wheat is the food of the people, barley and jowari are given to horses, while arzun and Indian corn are also grown for culinary purposes. Among a few large landowners and fruit growers improved agricultural implements, garden tools, and pumps for irrigation are used, but in most cases the high transport cost makes their purchase prohibitive.

The cultivation of turmeric and ginger and horse breeding are important. Silk is produced in considerable quantities at Kandahar,

¹ This class of winter melon (one of the *Cucumis melo*) has been successfully introduced in the United States and is now grown extensively in California, which is shipping them in large quantities to the Eastern States. One grower alone ships eight or nine carloads of the melons annually.

which is also the center of other arts and crafts. The quality of Kandahar silk could be much improved. The cocoons are small, of unequal size, and of different colors—yellow, white, and gray.

MINERAL RESOURCES.

Except a gold mine near Kandahar in charge of a European, the mineral resources of Afghanistan are almost entirely undeveloped, but in different localities gold, silver, iron ore, copper ore, lead, lead with antimony, antimony, silicate of zinc, sulphur, sal ammoniac, gypsum, coal, and niter are known to exist. Rubies are occasionally found near the Oxus River.

Rosaries are extensively manufactured at Kandahar from soft crystallized silicate of magnesia. This is quarried from a hill about 30 miles northwest of the city, where soapstone and antimony are also obtained. The stone varies in color from a light yellow to a bluish white and is generally opaque. The most popular kind is straw colored and semitransparent. A few specimens are mottled green, brown, or nearly black; they are used for the same purposes as the lighter varieties. Rosaries and charms of various sorts are made for exportation to Mecca. The waste powder from the rosary industry is used as a remedy for heartburn.

MEDICAL AND SURGICAL TREATMENT, CHILD MORTALITY, ETC.

Western medicines, drugs, and methods of treating diseases, wounds, etc., are apparently gaining ground rapidly in Afghanistan. The importation of drugs and medical supplies into Afghanistan through Baluchistan now amounts to about \$30,000 per year and through the Khyber Pass to \$2,500. The introduction of western medicines and methods of treatment has been accomplished partly through the important influence and example of medical missions along the Indian border and partly by the example set by His Majesty the Ameer in purchasing his own medical supplies outside of Afghanistan and in giving encouragement to local medical practitioners who have been trained in western methods. On several occasions His Majesty has had at his court European medical advisors. It is understood that all the European medical supplies for the Ameer and his Government are imported through the Bombay firm of Kemp & Co. (Ltd.), 7 Elphinstone Circle, Fort, Bombay.

Over 100,000 Afghan patients a year are said to visit medical missions on the border for special treatment. Many of these have eye diseases caused by sun glare, dust storms, and by flies, especially in children. Also there are many bullet or knife wounds which require surgical treatment. The mission hospital at Peshawar treats about 7,000 patients annually, of which two-thirds are Afghans.

THE NATIVE HAKIMS.

Except such medicines and drugs as are being imported into Afghanistan, the only remedies used to any extent there are purgatives, and especially of violent and drastic character. Nearly every Afghan thinks it necessary to be purged or bled, or both, every spring, and not infrequently at the fall of the year, too. Scarcely any illness is allowed to go to a week's duration without the trial of some

violent purge. Most of the doctoring in the country is done by "hakims," native uneducated persons, whose practices are entirely opposed to modern principles of *materia medica* and antiseptic surgery. For instance, in treating an abscess they apply an irritating ointment, which causes ulceration of the skin. Since the introduction of European drugs into Afghanistan some of the "hakims" have used them, but as they do so in ignorance of their therapeutic properties the results are rarely satisfactory, and in some cases are disastrous. They have great faith in the healing properties of a purge, but do not consider it has had any effect unless it acts at least 20 times. Dropsy is considered to be caused by an accumulation of bad gas in the tissues, and various lung diseases are supposed to be caused by the presence of slime in the body. Malarial fevers are treated by copious bleedings and purgings and by low diet. As malaria is one of the most common diseases in the country, the efficacy of the foreign method of treating it successfully by quinine has helped to create respect for foreign methods of medical treatment.

In distant villages where there is no "hakim" and the priest's amulet has failed to cure, the people either go untreated or treat themselves.

The above details as to medical treatment in Afghanistan are taken mainly from Dr. J. A. Gray's book entitled "*My Residence at the Court of the Ameer.*" Dr. Gray was medical adviser to the late Ameer, Abdur Rahman, until his death in 1901.

PRIMITIVE METHODS OF TREATMENT.

Some further details as to medical treatment in Afghanistan appear in the book of a medical missionary, the late Dr. T. L. Pennell, published in 1911, entitled "*Among the Wild Tribes of the Afghan Frontier,*" which states:

Cataract is a very common complaint in Afghanistan, and from time immemorial there have been certain "hakims," or native practitioners, who operate on this by means of the old process of couching.

The tooth extracting of the village is usually intrusted to the village blacksmith, who has a ponderous pair of forceps, a foot and a half to 2 feet long, hung up in his shop for the purpose.

When an Afghan comes to negotiate about the price of an eligible girl for marrying to his son, one of the first questions asked is, "Has she had the smallpox?" and if not, either the settlement may be postponed until she is older or else some deduction is made for her possible disfigurement if attacked by the disease. Many times fathers have brought their daughters to the hospital with the scars left by smallpox in their eyes, begging me to remove them, not so much for the sake of the patient as because the market value of the daughter will be so much enhanced thereby. The custom of inoculation was at one time almost universal in Afghanistan. A little of the crust of the sore of a smallpox patient was taken and rubbed into an incision made in the wrist of the person to be inoculated. The smallpox resulting, though usually mild, was sometimes so severe as to cause the death of the patient, and the people have not been slow to recognize the great advantages which vaccination has over inoculation.

Dr. Pennell mentions in his book that smallpox, as well as cholera and other contagious diseases, at times cause enormous loss of life in the country, and he explains that it is only superstitious considerations that deter the people generally from availing themselves of free vaccine facilities now offered by the British Government, which naturally, for the protection of India itself, desires to see such diseases checked in Afghanistan so far as possible.

HOSPITALS BEING ERECTED—FOREIGN INFLUENCE.

The Western method of vaccination for smallpox was introduced into Afghanistan about 12 years ago by Miss Lillias Hamilton, who up to 1903 held an appointment at Kabul for three years as medical adviser to the Ameer's harem. Since vaccination was thus introduced conditions as regards smallpox have not been nearly so bad as before. While Miss Hamilton was at Kabul multitudes of ailing people flocked to her for advice, and would often sleep outside her hospital all night in order to be attended to early in the morning.

Three Government hospitals are being erected in Afghanistan to be administered by Mohammedan doctors who have had medical training in India. The use of properly qualified Mohammedan doctors will probably meet the objections of the "mullahs," or priest class, to foreign methods of medicines. During the sojourn of Dr. Gray in Kabul he endeavored to establish courses of elementary instruction in the art of medicine, in physiology, and in anatomy, but his efforts seemed only to have aroused hostile agitation against them by local priests and native practitioners.

Not long ago the present Ameer summoned a European specialist for treatment of a dangerous abscess with which he was afflicted. The service rendered was so successful that His Majesty arranged with the Government of India for a permanent European medical specialist at his capital. Unfortunately, however, the first patient died on the operating table and this caused immediate discontinuance of these services. It is a common belief among medical authorities in India that this initial misfortune was due to an overdose of chloroform, deliberately administered to the patient by an assistant who wished to destroy the influence of the new Christian practitioner. Christian missionaries of any kind are rigidly prohibited from obtaining admission into Afghanistan, and the penalty for conversion of any of the native population to Christianity is death.

Infant mortality in Afghanistan is heavy. I am told by a leading medical missionary in Peshawar that, in his opinion, probably about one-half the children born in the country die before reaching the age of 3 years. There are no special pains exercised in the country to prevent such mortality, and the wandering and generally insanitary mode of life and the small attention paid to women and infants at childbirth account for the heavy infant mortality.

TIBET.^a

Considerable interest was aroused in the latter part of 1913 by the conference at Simla, the summer capital of India, between representatives of the Governments of India, China, and Tibet to decide questions concerning the relations of India and China with Tibet. The conference was presided over by Sir Henry McMahon, the Foreign Secretary of the Government of India. The plenipotentiaries included from China a high official of its Foreign Department, who has served at the British embassy in London, and from Tibet the Prime Minister of the Dalai Lama, supreme ruler of that country. By treaties between these three countries it seems likely that larger trade intercourse between Tibet, the great "hermit" nation, and the outside world may result.

Although the proceedings of this conference were kept secret, it was suggested in the Indian press that one desirable outcome might possibly be a free "open door" into this country for travel and trade even as far as Lassa, which has been perhaps the most closed and forbidden city in the world. It was officially stated, however, in the British Parliament that the Government of India invited the Tibetan and Chinese Governments to hold this conference at Simla, mainly to settle differences which had led to much bloodshed and the expulsion of Chinese troops from Tibet, and that the only desire of the India Government was to preserve peaceful relations between these States and to see that order is maintained on the Indian frontier from Kashmir to Burma. It was further said that the Russian Government had been fully apprised of the actions and intentions of the Government of India, and had expressed good will in the matter. Up to the present it seems that Tibet's trade with India and other relations had been somewhat confused and handicapped by the indefinite and conflicting relationships of China and Tibet concerning the enforcement of treaty obligations.^b

TIBETAN VISITORS WILL TAKE BACK FOREIGN-MADE GOODS.

The official visitors from Tibet at Simla doubtless went back to Lassa much impressed with the civilization south of the Himalayas,

^a AUTHOR'S NOTE.—While in Simla during October, 1913, I made an effort to obtain, as far as possible, information concerning the trade of the "hermit" country of Tibet, lying the other side of the Himalaya Mountains, a vast, thinly populated region concerning which little was known to the outside world until the time of the Younghusband expedition from India in 1904, which penetrated the country to the sacred and hitherto mysterious capital city of Lassa. By courtesy of officials of the Foreign Department of the Government of India, I was furnished with the few frontier trade reports and other official information concerning this country, and also was accorded an interview by the former political agent at Sikkim, Mr. Bell, now Deputy Secretary in the Foreign Department at Simla, who is one of the few persons who have ever personally visited Tibet. Notwithstanding the most painstaking study and search for information concerning the trade of this country, I have to regret the paucity of interesting data to present in connection therewith; nevertheless, as Tibet has a meager trade with the outside world, and is interesting more from the standpoint of its political relationships, its geography, scenery, religion, and curious customs, it is likely that the information herewith presented will be sufficient for the business people of the United States.

^b The conference ended without definite results, and subsequently there has been a renewal of hostilities between China and Tibet.

previously almost wholly unknown to them, and as a possible consequence may be inclined to lend their influence and power toward improved trade relationship. I was told by several leading shopkeepers at Simla that the envoys from Tibet expressed great interest in the various European and American articles displayed and were making many purchases to take back to Lassa.

TRADE STATISTICS.

The statistics of land trade of British India with foreign countries, published by the Commercial Intelligence Department of the Government of India, show that the trade between India and Tibet is extremely small, considering the vast area of Tibet, and is not even as large as such comparatively small frontier States in the Himalaya Mountains as Nepal, Sikkim, and Bhutan. Nearly one-half of all India's trade with Tibet is carried on from the Province of Bengal in northeastern India, especially from Darjeeling, the famous hill station in the northern part of that Province in the Himalayas. Somewhat less than one-fourth is carried on from the United Provinces and about one-eighth from the Punjab. There is also a small amount of trade carried on with western Tibet from Ladakh, the large Province in the northeastern part of Kashmir State.

The total imports into Tibet from Bengal, the United Provinces, and the Punjab amounted during the 12 months ended March 31, 1913, to \$423,454, to which Bengal contributed \$300,143, the United Provinces \$107,539, and the Punjab \$15,772. The total exports from Tibet into India through the same frontier Provinces amounted during the same year to \$808,475. Of this amount \$441,507 came through Bengal, \$243,331 through the United Provinces, and \$123,637 through the Punjab. There was also during the same year an import of about \$72,000 worth of treasure into Tibet, and an export from Tibet into India of about \$63,000 worth of treasure. This treasure included chiefly Indian silver rupees, and such transfers across the border were mostly through Bengal.

CHARACTER OF BUSINESS.

The following tables show the frontier trade between India and Tibet as regards both exports and imports in quantities and weights, and perusal of the details will indicate the character of the business conducted with this "hermit" nation by way of India. It will be noticed that the chief demand in Tibet is for piece goods, grain, including especially rice, dyeing materials, ironware, sugar, tea, and tobacco. Tibet pays for such purchases chiefly by exports of sheep and goats, hides and skins, and wool. The losses shown in trade for 1912-13 as compared with 1911-12 were probably due chiefly to the unsettlement occasioned by hostilities between Tibet and China.

Exports to Tibet from India, official years ending March 31.

(Cwt.—112 pounds.)

Articles.	1911-12	1912-13	Articles.	1911-12	1912-13
Animals, living (for sale):			Grain and pulse—Continued.		
Horses, ponies, and mules	6	5	Exports by Provinces—Contd.		
number..			United Provinces.....cwt.	34,020	34,990
Cattle.....do....	34	63	Bengal.....do....	2,620	2,264
Sheep and goats.....do....	2,002	845	Total.....do....	38,361	39,743
Other kinds.....do....	133	23	Hides and skins:		
Cotton goods:			Hides of cattle.....number..	12	.....
Manufactured—			Skin of sheep, goats, { ..do....	60	46
Foreign.....cwt..	130	112	and small animals. { ..cwt..	11	1
Indian.....do....	101	252	Jewelry and precious stones and		
Piece goods—			pearls unset: Coral...pounds..	100	238
Foreign—			Lac.....cwt..	17	5
Punjab.....do....	47	37	Metal and manufactures of		
United Provinces....do....	378	312	metals:		
Bengal.....do....	2,068	1,119	Brass and copper.....cwt..	706	357
Indian.....do....	3,802	3,672	Iron.....do....	3,305	1,734
Dyeing materials:			Other metals.....do....	157	156
Indigo.....do....	112	35	Oils:		
All other kinds.....do....	4,233	2,831	Petroleum.....do....	654	286
Fruits, vegetables, and nuts..do....	669	516	Other kinds.....do....	83	52
Glass:			Paints and colors.....do....	123	111
Beads and false pearls...do....	17	49	Provisions.....do....	1,723	592
Other sorts.....do....	94	37	Silk.....do....	27	33
Grain and pulse:			Spices.....do....	40	8
Wheat.....do....	3,577	3,454	Sugar:		
Gram and pulse.....do....	2,223	2,484	Refined.....do....	663	465
Other spring crops.....do....	16,420	17,176	Unrefined.....do....	3,770	4,583
Rice, husked.....do....	11,731	12,166	Tea, Indian.....do....	189	129
Rice, unhusked.....do....	139	279	Tobacco.....do....	5,475	754
Other grain crops.....do....	4,271	4,184	Wool, manufactured (piece		
Exports by Provinces—			goods).....cwt..	687	449
Punjab.....do....	1,812	2,489			

Imports into India from Tibet, official years ending March 31.

Articles.	1911-12	1912-13	Articles.	1911-12	1912-13
Animals, living (for sale):			Musk.....ounces..	103	2,865
Horses, ponies, and mules			Provisions.....cwt..	325	189
number..	608	742	Salt:		
Cattle.....do....	136	200	Punjab.....do....	1,303	7,648
Sheep and goats.....do....	25,224	23,004	United Provinces.....do....	21,810	30,139
Other kinds.....do....	107	59	Tea (foreign).....do....	224	122
Imports by Provinces—			Wool:		
Punjab.....do....	3,319	4,655	Raw—		
United Provinces....do....	12,641	14,306	Punjab.....do....	4,533	7,510
Bengal.....do....	10,318	5,044	United Provinces....do....	9,806	10,062
Borax:			Bengal.....do....	37,525	28,322
Punjab.....cwt..	897	293	Manufactured (piece goods)		
United Provinces....do....	21,014	13,539	.....cwt..	916	478
Dyeing materials.....(number)	17,296	1			
Hides and skins.....(cwt..)	108	32			

TRADING POSTS AND RESTRICTIONS.

The first regulations relating to trade intercourse between India and Tibet were specified in the convention between Great Britain and China in 1893, which stated that a trade mart should be established at Yatung, on the Tibetan side of the frontier, and be open to all British subjects for purposes of trade from May 1, 1894, and that the Government of India should be free to send officers, to reside at Yatung, to watch the conditions of British trade at that mart; moreover, British subjects trading at Yatung should be at liberty to travel freely to and fro between the frontier and Yatung, to reside there

and rent houses and godowns for their own accommodation and the storage of their goods, the Chinese Government undertaking that suitable buildings should be erected for such purposes.

Goods arriving at Yatung, whether from British India or from Tibet, should be reported to the customs station for examination, and full particulars given of the description, quantity, and value. With the exception of arms, ammunition, military stores, salt, liquors, and intoxicating or narcotic drugs, which might be prohibited at the option of either Government, goods entering Tibet from British India or vice versa should be exempt from duties for five years, commencing from the date of the opening of Yatung to trade.

NEW CONCESSIONS AND CONVENTIONS

The convention between Great Britain and Tibet, signed after the arrival of the Younghusband British expedition at Lassa, in September, 1904, specified that the Tibetan Government should open trade marts at Gyantse and Gartok, as well as at Yatung, to which all British and Tibetan subjects should have free right of access, and should keep the roads to these towns clear of all obstructions and in repair suited to the needs of the trade. The Tibetan Government also undertook to levy no duties unless later mutually agreed upon. It was further provided that no concessions for railways, roads, telegraphs, mining, or other rights should be granted to any foreign power, or the subjects thereof, except by mutual consent, when similar concessions should be granted to the British Government. It was also provided that the Tibetan Government should appoint an agent who would be responsible for the transmission of correspondence in Tibet between the British and Tibetan Government officials.

In 1907 a convention was signed between Great Britain and Russia by which they engaged not to send representatives to Lassa, nor to seek to obtain, whether for themselves or their subjects, any concessions for railways, roads, telegraphs, and mines or other rights in Tibet. It would appear from the terms of this convention that some anticipations in India as expressed by the local press, such as permission to have a British trade representative at Lassa, could not be realized as a result of the late conference at Simla unless Russia specially gave its consent. Owing, however, to the recent increasing Russian influence in Mongolia, and the reported arrangement whereby Russia will be allowed to have a consular representative at Urga, the capital of Mongolia, it is said to be possible that Russia may permit an equal concession to the interests of Indian trade at Lassa. Since the convention was signed with Russia concerning Tibet, it has been practically impossible for even British subjects to obtain permission from the Indian Government to visit Tibet, except for trade at the three authorized trade marts. No permission at all is granted to tourists, explorers, or scientists to enter Tibet from the India side, except, possibly, so far as these trade marts, and then only after important representations have been made as to the nonpolitical character of their trips, which of course would have to be undertaken at their own risks.

ROAD CONSTRUCTION FOR IMPROVING COMMUNICATION.

Trade between India and Tibet has to be carried through lofty passes between 14,000 and 18,000 feet high, most of which are practically impassable during seasons of heavy rain and snow. Sheep and also crosses between yaks and ordinary cattle are used as beasts of burden. The most important route into Tibet from India is from Siliguri, near Darjeeling, in northern Bengal, and across the small frontier State of Sikkim to Gyantse and Yatung, in Tibet, the two leading trade marts authorized by the existing convention. The other chief means of access to Tibet are from Almora, in the northern part of the United Provinces, and from Simla over the Simla-Tibet road to Gartok, in western Tibet, which is about 14,200 feet above the sea. From Almora to Gartok the direction is almost due north and from Simla to Gartok is almost due east.

In a lecture delivered while I was at Simla, by Lieut. G. Burrard, of the British Army in India, concerning the Tibetan frontier, it was stated that the only road construction possible to improve existing difficult communications between Tibet and India would be along the valley of the Sutlej River, along which the Simla-Tibet road (now a mere trail much of the way) already ran. On this route there are no very steep gradients and only one difficult pass has to be crossed. The yaks now used for transport on this route carry about 240 pounds and subsist by grazing on the way. Although the Simla-Tibet road is perhaps impracticable in some places for persons or cattle not sure of their footing along dangerous cliffs, it is not hard or impossible except after the rains or heavy snows.

HOW FOREIGN GOODS ARRIVE.

In Lassa imports are said to arrive mostly in December, and the caravans leave in March before the rivers become flooded. Chinese goods sold here include chiefly silks, carpets, porcelain, and tea bricks. From Mongolia, or possibly from Russia through Mongolia, come leather, saddlery, sheep, and horses, with coral, amber, and small diamonds probably of European origin. From India and from the frontier States of Sikkim, Bhutan, and Nepal, just north of India, come such articles as are enumerated in the table of trade. Some of the interesting items of trade which do not appear separately in the goods as classed in the table include mirrors, spectacles, umbrellas, soap, towels, and imitation gold foil. The spectacles are largely of smoked or colored glass, and are apparently much desired because of the great glare of the sun and dazzling reflections where there is much snow. The trade in cotton piece goods includes blue, printed, and fancy cloths and cambrics. There is also considerable woolen cloth and broadcloth imported. As most of Tibet is at extremely high elevations, making the climate cold and the temperature in winter often below zero, warm clothing is necessary. It is common to wear skins of animals and woolen cloths over thinner cotton apparel. At Lassa opium is said to be sold for its weight in silver.

The exports from Lassa are silver, gold, salt, wool, and felt woolen cloth known as "namdas," rugs, furs, drugs, and musk.

CHINESE FRONTIER TRADE WITH TIBET.

The great bulk of China's trade with Tibet is transacted at Tachienlu, and from its location on the exact geographical and ethnological boundary of China and Tibet, Tachienlu is marked out to be the natural emporium of the trade of these two countries. East of it the conditions which obtain are those under which trade in all parts of China is conducted; communications, transport, currency, are all Chinese. To the west the inhabitants, except for a handful of Chinese officials, merchants, and troops, are Tibetans, and the ordinary coinage of China is not current; while owing to the high altitudes and numerous passes, coolie transport is no longer practicable, and is replaced by the yaks, ponies, mules, and asses indigenous to the country. West of Tachienlu the country is purely Tibetan in its people, climate, products, and geographical characteristics; the population is scanty and widely distributed and has but few of the requirements which form the basework of commercial activity amongst more civilized and advanced peoples. For these reasons neither the borderlands nor Tibet itself offer much opportunity to commercial enterprise.

The greater part of the trade between China and Tibet is transacted between the large Chinese firms in Tachienlu and merchants who come in annually from Tibet and from the larger centers of the border country. The residue concerns solely the balance of the local trade of the borderlands and is carried on by Chinese and Tibetan retailers who either have shops at Tachienlu and other centers in the Chinese sphere of control, or travel amongst the tribal people, for the most part as distributors on commission for the Tachienlu wholesale houses. There are in addition a few independent Chinese merchants who buy goods at Tachienlu and exchange them in the interior for native products; the trade they handle is of very small bulk when compared with that transacted at Tachienlu.

The majority of the Tibetan and border merchants who come to Tachienlu bring with them native products to pay for the Chinese goods they buy. Some, however, are buyers only and bring as payment gold dust or Chinese rupees, of which there are large quantities in Tibet and on the border. Others are sellers only and take back with them Chinese rupees or silver. One or two of the Tibetan merchants whose dealings are extensive are allowed from 6 to 12 months' credit and eventually settle their accounts with the Chinese firms by remitting the money to Shanghai via India.

CHARACTERISTICS OF THE PEOPLE.

An interesting description as to certain features of trade at Lassa, the articles for which there is demand, and the way in which they are sold appears in a book published by Lieut Col. L. A. Waddell, who accompanied the Younghusband expedition, in 1904, on Lassa and Its Mysteries:

Many Tibetans showed an acquaintance with soap, a commodity which was evidently much in demand, as it appeared for sale on most of the stalls, and has for years been one of the chief imports. The love of jewelry is indeed one of the leading traits of a Lassaite. He is a poor man who does not sport a long earring with a pearl and

turquoise pendant, massive silver bangles, a huge bone thumb ring, and amulet box, in addition to a turquoise inlaid prayer wheel. It is, however, his women folk who lavishly indulge this taste. They are literally loaded from top to toe with massive trinkets; tiaras of red cloth, incrusted over with great pieces of coral, amber, and turquoise as big as marbles, encircle the smoothly polished locks of their plaited hair; huge gold or silver earrings studded with turquoise sweep their shoulders; large filigree gold or silver amulet boxes hang round their necks, waist belts with enormous silver buckles gird their loose wrapper-like gowns and suspend a chatelaine with a bunch of keys, silver toilet implements, and chopsticks, all of which articles were in great demand by our people as curios. The rosary of the women is generally of white shell or colored glass beads, while those of the men are commonly yellow willow wood, and the prayer wheel which they piously twirl usually contains a few inlaid turquoisees.

The partiality of the Tibetans for turquoise and coral is remarkable. For the larger pieces of the latter they pay about \$20 an ounce, equal to their weight in gold. Nor is this taste of recent growth; writing so long ago as the twelfth century, Marco, the Venetian, says, regarding his visit to this land: "Coral is in great demand in this country (Tibet) and fetches a high price, for they delight to hang it round the necks of their women and of their idols." Still greater do they esteem the turquoise, as they attribute mystic talismanic virtue to it. They believe that it guards against the "evil eye," and brings good luck and health.

The only persons who were not extravagant in dress were the poorer children, many of whom dispensed with garments altogether and ran about flying kites and playing in the streets naked, notwithstanding the severity of the climate, with snow lying in August on the hills about 800 feet above the plain.

DWELLINGS OF THE PEOPLE.

The houses of the citizens are substantially built of stone or sun-baked bricks. The walls neatly whitewashed, and the woodwork picked out in colors, with charms against the "evil eye" pasted over the doorway, give a general look of comfort from the street. But a glance within dispels the illusion and shows the interior to be quite as squalid and dirty as those of the wretched hovels in the country, reflecting the general poverty of the place. The more well to do also live in a curious mixture of squalor and dirt. Their larger houses have similar mean and untidy interiors, although some of the more wealthy, imitating the Chinese, have sufficient taste to ornament their interiors with paintings, frescoes, and better furniture, and a very few may have one or two glazed windows, a great rarity in Lassa.

The houses of the poorer class have usually two rooms, one to sleep in and another to eat in, each of which, especially the latter, has a fire hearth, usually in the middle and without a chimney, so that its smoke japs darkly the whole interior. For furniture a rudely hewn low bench serves as a table and some logs of wood or boxes as chairs; in one of these boxes are treasured the valuables of the family, a few fine clothes, trinkets, a spare rosary or prayer wheel, and the horoscopes. From pegs in the wall hang bladders of butter, which may have been kept for years, strings of cheese, bits of meat, yak-hair rope, cooking ladles, and other implements, and in a niche in the wall or on the top of a box is a little shrine for the image of the household gods, besides a small religious picture and a few charms. Some clay and iron cooking vessels and utensils, strewn between tubs containing water and evil-smelling stores of grain and other provisions, complete the furnishings of the room in which the average Tibetan lives in miserable poverty.

His food, even in the town, consists of a few simple staple dishes, with which the nomadic class all over Tibet must suffice be content. As a beverage he drinks all day long cupfuls of hot "buttered tea," which is really a soup or broth made by boiling tea leaves with rancid butter and balls of dough and adding a little salt and straining. No doubt it is wholesome. For some it is not a merely stimulating hot drink in the cold, but overcomes the danger of drinking unboiled water in a country where the water supply is dangerously polluted. Instead of bread he eats unleavened scones of wheat or barley meal eked out with the meal of roasted grains of barley dry or made into a broth. The chief dish is a stew of meat and potatoes, turnips, cabbage, and other vegetables, with, as a relish, some dried cheese, and on festive occasions a nibble at brown sugar, which is never used for tea. His strong drink is the beer of the country, made from fermented barley. It is not strong in alcohol and has a vinegary taste and smell, but when newly made it is cool and refreshing in summer. A coarse, fiery brandy is distilled from it, but is not extensively drunk. Although a good deal of beer is consumed, drunkenness does not seem to be a common vice among the people.

ARTICLES FOR SALE.

The Tibetans display wares for sale on stalls in streets and have no proper shops. The Chinese, however, have shops with counters. The stalls and booths in the streets contain a great variety of furs brought from the neighboring hills, chiefly of the civet and weasel tribe, and including some Tibetan sable, for which about \$4 per skin was asked. Larger skins of the silver lynx, tiger cat, clouded leopard cat, otter, woolly tiger, and bear were also brought in. Among the fruits were excellent persimmons, cooking peaches, crab apples, mulberries, gooseberries, and red currants. The eggs here were so old that many of them were black with age, as the Tibetans imitate the Chinese in esteeming them a great delicacy when putrid. Sheep are not used here to carry loads as they are in the rocky tracts of the northwestern Himalayas; this is not from any religious scruples, but merely because the roads are sufficiently good for the employment of the larger animals. The tea caravans seldom go more in a day than a stage of 5 miles.

As trade in Tibet is chiefly by exchange or barter, and comparatively few articles are paid for in cash, bricks of tea are often used as a convenient currency instead of money, being in such universal demand, while at the same time they are limited in production, fairly portable, and of nearly uniform size. Money is, however, also current and coined by the Tibetans at their mint in Lassa. It is in the form of crudely fashioned silver pieces about the size of a halfpenny, but thick as a sixpence, and modeled after the Nepalese "tangka," which Indian name it also bears. Tibet used to import these coins from Nepal, but has for several years been minting its own and retaining on them the eight lucky symbols. Its value is that of its silver, equivalent to 5 pence, and like its Nepalese prototype is clipped into a half, a third, or a quarter to form coins of smaller denomination. The almighty Indian rupee is, however, in great demand.

THE TEA TRADE.

As Tibet is a nation of tea drinkers, there is considerable desire among the tea growers of Assam, in the extreme north of India, to share with China in the Tibetan tea trade, and over the question of removing restrictions against importation of Indian tea into Tibet there have been some serious difficulties, which partly caused the sending of the Younghusband expedition into that country. Chinese tea bricks now chiefly sold in Tibet consist of hard blocks of tea leaf and crushed twigs mixed with a strong extract of the boiled leaves and compressed. The cakes weigh about 5½ pounds each, and being in universal demand and fairly portable and uniform in size, they are, as above stated, often used as currency or substitute for money at their market value. About 12 of the bricks, weighing about 70 pounds, are usually sewn into bales of skin to form loads for yaks or mule carriage.

WOOL AND SHEEP.

The wool and sheep industry of Tibet is probably capable of considerable development. Felted wool is much used in Kashmir to carry embroidery patterns, and is reexported in the form of attractive rugs and carpets. Gyantse, in southeastern Tibet, is rather noted for a woolen rug and carpet industry. There is also considerable trade from Tibet in shawl wool or "pashm," which consists of felted silky underwool of goats, sheep, and yaks. It is said that a vast amount of this wool is wasted in Tibet every year; as the Tibetans do not realize its considerable value.

In the Indian Trade Journal of May 15, 1913, appeared an interesting mention of the Tibetan wool trade, as follows:

The dry climate and the absence of thorny undergrowth are said to afford favorable conditions for the introduction of the Australian merino strain, but so far the improvement in the local flocks seems to relate to quantity rather than quality. There seems

to be no reason why larger flocks should not be raised in Tibet; but the volume of the country's trade in wool across certain of the passes is limited by the fact that the tracks are impassable to pack animals other than sheep and goats and by the inadequacy of the grazing on the route. It remains therefore as important as ever to improve the quality and so raise the value of the produce brought down over these passes. We have previously pointed out that one means by which this could be done was to scour the wool on the other side of the passes and so eliminate the dirt and grease now transported at great cost. It was mentioned that borax, a local product of those regions, is an excellent detergent for wool and that such borax as is brought to India should also be freed of its dirt before being packed. There have been rumors from time to time that the scheme was to be tried, and the imposition of an export duty upon borax sent to India forms an additional reason why it should, if possible, be put to industrial use in Tibet. The duty as instituted in 1908 was 10 per cent on all borax or salt sold by the Tibetans to Indian traders, and the trade has undoubtedly declined. Owing mainly to the resistance of the Bhutanese, the duty was in 1912 reduced to 5 per cent, but it is still regarded by traders as of a seriously deterrent kind and as creating some fear of similar duties on wool and pashm.

PRODUCTION OF BORAX.

Borax (borate of soda) is found along the shores of certain lakes in Tibet and in the Province of Ladakh, in western Kashmir, bordering on Tibet. It is also found deposited with sulphur near the hot springs in the Puga Valley. Most of the borax from Tibet and Ladakh comes to India for export and distribution. The average annual import from Tibet into India during the last 10 years was 19,461 hundredweight of 112 pounds, about 95 per cent of which entered India through the United Provinces.

Crude borax from Tibet, after it enters India, is refined at some of the frontier stations and then distributed to the different provinces for consumption and export. It is extensively used in India in medicine and as a mordant in dyeing and calico printing. It is indispensable to brass founders and the makers of glass beads, and enters largely into pottery glazes and enamels for metallic surfaces.

GOLD MINING.

It has been stated by the few travelers who have visited Tibet that large gold mines undoubtedly exist, but their extent can not be ascertained until the country is fully explored. The metal is mined at several places over tracts some 300 miles in length on the desert to the northeast of Lassa. The best gold is said to come from a reef a few days' journey due east of Lassa. Near the frontier of the State of Bhutan, at the source of the Subansiri River flowing into Assam, there are many colonies of gold washers. The Tibetan gold is found in nuggets as well as in spangles and dust, but Tibetans are said to be careful to leave the nuggets intact or to replace them if disturbed under the belief that they are living and are the parents of the spangles and gold dust, which latter would disappear were the lumps removed.

From the eastern frontier of Tibet in China to the western frontier at Kashmir the distance is about 1,200 miles, and from the northern frontier in the Kuenlun Mountains, on which eastern Turkestan borders, to the Himalaya Mountains in the south, separating the country from India, about 600 miles. Gyantse in the southern part of Tibet, which by treaty regulation is open to British trade, is 213 miles from Silliguri, near Darjeeling in India, and 140 miles from

Lassa. The central position of Gyantse at the junction of roads from India and Bhutan with those from Ladakh in Kashmir State and central Asia, make it an important distributing trade center.

POPULATION—CHARACTER OF COUNTRY.

The population of Tibet, scattered over this enormous area, is probably not over 1,000,000, except that this does not include some densely settled country near the Chinese frontier. The most curious feature concerning the population is that the lamas, or monk or priest class, comprise probably about one-third of the whole population. The only census ever taken of Tibet was by the Chinese in 1737, and showed 316,300 lamas and 635,950 laity. It is not likely that there has been much change since these statistics were taken nearly 200 years ago, although there has doubtless been decrease rather than increase. According to some figures recently given out by the consul of the State of Nepal at Lassa, the population of this capital city is estimated at about 30,000, two-thirds of whom are lamas. As to the remaining 10,000 people in that city, 7,000 are Tibetans, and of these 5,500 are women. There are also about 2,000 Chinese, about 800 Nepalese, and the remainder traders from Mongolia, Ladakh, Bhutan, etc.

The population of Tibet is greatest along the eastern border on the Chinese frontier where the tableland has the least elevation above sea level, so that conditions of vegetation become more favorable. The climate becomes colder and the soil more difficult of cultivation as the land rises toward the west, until finally near Ladakh, the country is almost an uninhabited desert. Tibet is not a flat but a very uneven tableland, intersected by many mountain ranges, containing, however, many flat-bottomed valleys, some of which are quite fertile. There is said to be considerable arable land which is not cultivated, or where former cultivation has been abandoned. A leading cause of such deficiency in possible population is said to be the great proportion of persons who become celibate priests, or lamas. There have also been many deaths from devastating epidemics of smallpox.

A NATION OF TRADERS.

The population is not only small but widely scattered over an enormous area of country, so that even when foreign goods gain general access to the country over the difficult and lofty passes of the Himalayas, there still remains the problem of their distribution among the comparatively small number of people inhabiting the vast tableland beyond. These problems of transport and distribution, however, the Tibetans seem individually to master to an interesting extent. Their sheep and cattle are not only their chief form of wealth, but of transport as well. Except for the ability of these Tibetans to travel over huge tracts of their country and reach markets where they can buy and barter to obtain a few necessaries or comforts of life, there would probably be practically no market in Tibet for foreign goods. Col. Younghusband's book on India and Tibet states that the Tibetans are born traders and a nation of shopkeepers and that men and women—the women even more than the men—and priests and laity all trade, and that it is curious that people who are naturally sociable and born traders should have so

long excluded themselves from the outside world, although of late years the departures of Lassa merchants to India have become more frequent.

VISITING TIBETAN TRADE MARTS.

There appears to be some inquiry as to the feasibility of American commercial travelers entering Tibet for trade. I was informed by a leading official of the Foreign Department of the India Government at Simla that if suitable representations were made permission might be granted to visit the trade marts open in accordance with the present treaty with Tibet. To obtain such permission application would have to be made to the Foreign Department at Simla and proper credentials furnished. As the chief route into the most important part of Tibet to the trade marts at Gyantse and Yatung is by way of the semi-independent State of Sikkim, permission to enter Sikkim must be obtained from the British political agent at Sikkim. No permission under any circumstances or for any purposes would be granted to travelers to proceed north of the authorized trade marts.

Should travelers secure permission to visit the authorized trade marts, it would be necessary to make elaborate and costly arrangements for transport and for coolies, so that such trips into Tibet could scarcely pay as business propositions, and many discomforts and some dangers would doubtless be experienced. It would apparently prove much better policy, from the standpoint of business, to introduce American articles into Tibet by exhibiting and selling them to Tibetan traders who have themselves crossed the lofty mountain barriers to buy needed supplies on the Indian frontier. I understand that certain American articles, such as sewing machines, have already been introduced into Tibet in this way. American guns have apparently in the past made their way into Tibet through China, and Col. Young-husband mentions that during the course of hostilities with the Tibetans it was noticed that their rifles were of American make, but apparently ruined by long neglect.

COMMERCIAL RESTRICTIONS.

Although in accordance with the present treaty arrangements between Tibet and India there should be practical free trade between the two countries as regards most articles, yet recent reports from British officials on the frontier state that trade with Tibet continues to be seriously hampered by the imposition of illegal dues and by vexatious interference with trade contrary to the Tibetan trade regulations. It is probable that some relief from such conditions was sought by the India Government at the conference in Simla.

There is probably as much or even more trade with Tibet through China than through India, and it is said that the means of access to Tibet from the direction of China are easier than from India, so long as conditions in China are normal and peaceable. Also, the largest population in Tibet is near the borders of China.

Although Tibet is an extremely interesting country in many ways, yet commercially it has not yet attained any great importance. Though possessing some large resources, yet little or no economic benefit is derived therefrom. For instance, enormous resources in water power are utilized only for driving a few praying machines. The chief buildings are temples or monasteries, and by far the leading occupation is the priesthood.

572 RESOURCES, INDUSTRIES, AND TRADE OF BRITISH INDIA.

Value of British India's trade with the principal transfrontier States.

States and principal articles.	1912-13	1913-14	States and principal articles.	1912-13	1913-14
AFGHANISTAN.					
Imports therefrom.	\$4,122,000	\$4,185,000	Imports therefrom.	\$487,000	\$1,007,000
Fruits, vegetables, and nuts.	1,392,000	847,000	Animals, live.	117,000	258,000
Ghee.	380,000	365,000	All other articles.	370,000	749,000
Raw wool.	1,547,000	2,399,000	Exports thereto.	423,000	521,000
All other articles.	803,000	574,000	Cotton piece goods.	63,000	54,000
Exports thereto.	8,078,000	4,930,000	All other articles.	360,000	467,000
Cotton twist and yarn.	428,000	200,000	SIKKIM.		
Cotton piece goods.	3,898,000	2,569,000	Imports therefrom.	487,000	681,000
Leather.	637,000	311,000	Wool, manufactures of.	277,000	306,000
Metals, and manufactures of.	282,000	170,000	All other articles.	210,000	375,000
Sugar.	399,000	229,000	Exports thereto.	355,000	584,000
Tea.	1,071,000	399,000	Silk.	160,000	219,000
All other articles.	1,363,000	1,052,000	All other articles.	195,000	365,000
DIR, SWAT, AND BAJAUR.					
Imports therefrom.	2,788,000	2,531,000	Imports therefrom.	6,195,000	6,555,000
Grain and pulse.	394,000	681,000	Horses, ponies, and mules.	292,000	233,000
Hides, cow.	360,000	355,000	Cattle.	613,000	963,000
Ghee.	934,000	784,000	Husked rice.	233,000	185,000
Timber.	350,000	146,000	Metals, and manufactures of.	720,000	545,000
All other articles.	750,000	565,000	Pickled tea (ketpet).	779,000	1,080,000
Exports thereto.	2,933,000	2,822,000	Foreign tea.	949,000	784,000
Cotton twist and yarn.	428,000	530,000	Teak timber.	263,000	419,000
Cotton piece goods.	1,455,000	1,392,000	All other articles.	2,346,000	2,326,000
Grain and pulse.	170,000	39,000	Exports thereto.	6,584,000	5,937,000
Spices.	195,000	131,000	Cotton twist and yarn.	492,000	404,000
All other articles.	735,000	730,000	Cotton piece goods.	2,389,000	2,122,000
CENTRAL ASIA.					
Imports therefrom.	131,000	389,000	Metals, and manufactures of, chiefly iron.	1,260,000	998,000
Charas.	83,000	185,000	Oils.	292,000	253,000
Raw silk.	14,000	180,000	Fish.	496,000	491,000
All other articles.	34,000	24,000	All other articles.	1,655,000	1,669,000
Exports thereto.	97,000	584,000	SHAN STATES.		
Cotton piece goods.	49,000	253,000	Imports therefrom.	6,195,000	6,555,000
All other articles.	48,000	331,000	Horses, ponies, and mules.	292,000	233,000
PERSHIA.			Cattle.	613,000	963,000
Imports therefrom.	131,000	97,000	Silk, manufactures of.	233,000	185,000
Silk.	14,000	29,000	Teak timber.	428,000	345,000
All other articles.	117,000	68,000	All other articles.	152,000	277,000
Exports thereto.	618,000	715,000	Exports thereto.	647,000	550,000
Cotton piece goods.	268,000	243,000	Cotton twist and yarn.	136,000	126,000
Leather.	146,000	165,000	Cotton piece goods.	151,000	102,000
All other articles.	204,000	307,000	Silk, manufactures of.	73,000	54,000
NEPAL.			All other articles.	287,000	268,000
Imports therefrom.	14,731,000	14,050,000	WESTERN CHINA.		
Cattle.	1,085,000	1,105,000	Imports therefrom.	715,000	939,000
Dyeing material.	224,000	282,000	Raw silk.	287,000	384,000
Rice.	4,492,000	5,173,000	All other articles.	428,000	555,000
Hides, cow.	1,450,000	672,000	Exports thereto.	2,044,000	1,815,000
Raw jute.	1,533,000	1,173,000	Cotton twist and yarn.	1,050,000	837,000
Ghee.	1,095,000	1,032,000	Cotton piece goods.	628,000	715,000
Linseed.	477,000	306,000	All other articles.	336,000	263,000
Mustard and rape.	1,032,000	983,000	SIAM.		
Spices.	389,000	409,000	Imports therefrom.	1,134,000	1,426,000
Tobacco.	307,000	399,000	Cattle.	350,000	545,000
All other articles.	2,647,000	2,516,000	Silk, manufactures of.	204,000	258,000
Exports thereto.	7,042,000	6,652,000	Teak timber.	428,000	345,000
Cotton twist and yarn.	813,000	696,000	All other articles.	152,000	277,000
Cotton piece goods.	2,501,000	2,458,000	Exports thereto.	647,000	550,000
Metals, and manufactures of, chiefly brass.	676,000	642,000	Cotton twist and yarn.	136,000	126,000
Oils.	467,000	336,000	Cotton piece goods.	151,000	102,000
Salt.	448,000	389,000	Silk, manufactures of.	73,000	54,000
Spices.	452,000	389,000	All other articles.	287,000	268,000
Sugar.	345,000	331,000	KARENNAI.		
Tobacco.	297,000	243,000	Imports therefrom.	842,000	1,134,000
All other articles.	1,041,000	1,168,000	Cattle.	273,000	355,000
TIBET.			Silk, manufactures of.	491,000	691,000
Imports therefrom.	813,000	1,071,000	Teak timber.	78,000	88,000
Raw wool.	448,000	715,000	All other articles.	160,000	195,000
All other articles.	365,000	355,000	Exports thereto.	29,000	29,000
Exports thereto.	423,000	647,000	Betel nuts.	131,000	166,000
Cotton piece goods.	170,000	233,000	OTHER STATES.		
All other articles.	253,000	414,000	Imports therefrom.	1,110,000	1,169,000
			Animals, live.	1,366,000	1,266,000
			Teak timber.	33,678,000	35,234,000
			All other articles.	30,820,000	27,218,000
			Total imports.	33,678,000	35,234,000
			Total exports.	30,820,000	27,218,000
			Total land trade (excluding treasure).	64,496,000	62,452,000

CEYLON.

Ceylon is essentially an agricultural country, and its manufactures are chiefly related to the products of agriculture. Out of 1,112 factories in the island 78 per cent are tea factories. Coconut products are manufactured in 76 factories, cocoa in 23, and rubber in 41. The preparation of coconut oil, copra, and arrack gives employment to a large number of the inhabitants, and so to a smaller extent does that of citronella oil and cinnamon. In the northern Provinces much tobacco is grown and cigars are manufactured in Jaffna, but the trade, principally with India, will always be limited. The making of lace, native hardwood furniture, jewelry, and brassware is carried on in various localities by villagers who work at these trades in their homes. Plumbago mining is wholly in the hands of Singhalese, while the Moors either control the gem mines direct or their output. These industries provide considerable income for a comparatively small number of persons. Tea, coconut products, rubber, plumbago, cocoa, citronella oil, and tobacco, in the order named, constitute Ceylon's principal products and chief exports.

In general, it may be remarked that conditions in Ceylon have never been more flourishing, and that all its people, from the lowest to the highest, are enjoying prosperity.

The Ceylon Chamber of Commerce has its headquarters at Colombo and publishes an excellent monthly journal which gives detailed statistics of foreign trade.

POPULATION AND RELIGIONS.

Ceylon, which is about equal in area to the State of West Virginia, has about 4,262,000 inhabitants. The native Ceylonese, or Singhalese, comprise 65 per cent; the Tamils, 27 per cent; the Moors, 6.3 per cent; and the Europeans, 0.2 per cent.

The four main religions are divided approximately as follows: Buddhists, 60 per cent; Hindus, 23 per cent; Christians, 10 per cent; and Mohammedans, 7 per cent.

URBAN AND RURAL POPULATION.

The city population compared with the rural is about as 1 to 7, slightly more than six-sevenths being classed as country folk. The urban population composes that living in 31 towns, ranging from Colombo with 235,829 to Lunugala with only 549 inhabitants. Only three cities, besides Colombo, have over 30,000 inhabitants. Jaffna, with 42,139, is located at the extreme north of the island and is the seat of an American mission. Galle, at one time the chief port of Ceylon, has 40,621 and is located at the extreme south of the island. Kandy, the ancient capital of Ceylon, where the Kandyan kings held dominion, has a population of 30,794. It is located upcountry, 70 miles from Colombo, and is chiefly noted as the seat of the famous "Temple of the Tooth."

There are 113 males to every 100 females in Ceylon. Of the men 18 per cent are illiterate, while 59 per cent of the women can not read or write. The density of population is 162 per square mile; the average number of persons per house is 5.2 and per family 4.7.

INCOMES OF PEOPLE.

No estimate pretending accuracy can be made of the incomes of the people. The salaries of Europeans range from \$100 per month, for lads who come out to join commercial firms or tea estates, up to \$15,000 per year for the heads of important business firms. Among Burghers and Singhalese salaries may go up to \$3,000 and even \$4,000 per year or more in some instances, but the average for a man of family will not exceed \$85 per month. However, a man of these races who receives such a salary can probably support his family and save something out of it. It is not an uncommon thing to find men employed at salaries of \$35 to \$100 per month who have private property interests which bring them in thousands of rupees per year. The successive booms in coconut products, plumbago, tea, and rubber have made many Singhalese and Burgher families, especially among the landholders, very rich. Of course, the vast bulk of the people receive no more than 10 to 30 cents (gold) per day for their labor, and are, in the western sense, poor; but extreme poverty is rare, and even the most obscure villagers have enough for their wants.

AUTOMOBILES.

PROGRESS IN MOTOR-CAR TRADE.

[By Consul Charles K. Moser, Colombo.]

The surprising interest which Ceylon has developed in low-priced motor cars since the beginning of 1913, and in the use of the motor truck as a means of freight transport in place of the bullock cart, has more value for American motor-car manufacturers than for any other in the world. It is the low-priced American car that is making the most headway in this market, and it is easily the one with the most promising future. The demand for luxurious, high-priced European cars may be said to have nearly approached its limit; while the market for low-priced cars, among Ceylonese of comparatively moderate means, has scarcely been tapped. To appreciate it at its true value a few general facts about the island and its inhabitants which have some bearing upon the capacity of the people as buyers should be understood.

LIKING FOR MOTOR CARS.

While perhaps a comparatively small proportion of the total population is able to buy motor cars, yet in all these races there are families of much pomp and circumstance who are rapidly becoming accustomed to the use of the motor car in place of the pageant-like black-and-gold English victoria, with its rich harnessings and its footmen in elaborate uniforms. Tamils, Singhalese, and Moors are especially fond of motor cars and have a keen appreciation of the added dignity which the possession of one gives to their families in

the eyes of the rest of the community. Even among those who, according to American standards, could not afford it the possession of a motor car has come to be a cherished dream, and if motor cars could be bought on a low installment plan there are families which would deprive themselves even of the necessities in order to buy one. It is never safe to say who can afford to buy a motor car among this acquisitive population with its curiously democratic habits of living.

USE OF MOTOR VEHICLES—IMPORTS.

It is impossible to give the number of motor vehicles in use in Ceylon, as no complete statistics of such are kept. At the end of June, 1913, there were 1,368 motor cars and motor cycles registered for use in Colombo, but this does not take into account the motor vehicles owned by persons outside of the city. It is probable that tea planters in the Uva, Uda Pussellawa, Kelani Valley, Kandy, and Nuwara Eliya districts own almost as many, and that the total number in the island is not far short of 3,000. If one-third of these are motor cycles, the estimate of 2,000 motor cars of all sorts will probably not be far wrong. Of this number there are perhaps 30 motor trucks and lorries in use in the island, principally Albions and Lacades of British manufacture.

The United Kingdom supplies more pleasure cars than all other nations combined. Until 1912 the German cars ranked second in point of popularity and the French third, but in that year and since American cars have held second place, and in 1913 twice as many American cars were sold here as French and German cars combined. According to the customs returns, Ceylon imported 89 motor cars (complete) in 1908, 75 in 1909, 151 in 1910, 213 in 1911, 243 in 1912, and 396 in 1913. The following table shows the imports of complete motor cars, by countries, in 1912 and 1913:

Kind.	1912		1913	
	Number.	Value.	Number.	Value.
British.....	189	\$472,628	232	\$486,327
French.....	9	24,121	19	44,003
Austrian.....	2	3,486		213
German.....	19	59,604	25	120,047
Italian.....	1	1,977	4	11,653
Swiss.....	1	1,947	1	1,947
American.....	23	21,863	115	89,739
Total.....	243	585,626	396	753,929

MOST POPULAR CARS—FEATURES DESIRED.

With the exception of three old American steam cars all the pleasure cars in use burn petrol or gasoline for fuel. There are no electric runabouts. The following cars, in the order named, are most popular in Ceylon in their grade: Cars from \$2,750 upward—Wolseley-Siddeley, Sunbeam, Austin, Napier, Berliet, Benz, Opel, Lancia, and Fiat; cars from \$1,850 to \$2,750—Adler, Vulcan, Argyll, Arrol-Johnston, and Swift; cars from \$1,000 to \$1,850—Ford, Overland, Hupmobile, Maxwell, Studebaker, and Krit.

The preferred car in Ceylon is a four-cylinder, 15-horsepower car (R. A. C.^a rating), and there are many more below this power than above. Six-cylinder cars are too heavy and too long for use in this district, and there is no necessity for either great speed or large horsepower. The ratio of gears preferred can not be given exactly, but may be stated approximately as follows for cars of four speeds: 13.2 to 1, 8.7 to 1, 5.9 to 1, and 4 to 1.

There is no market for cars of over 20 horsepower, R. A. C. rating. Motor-car agents generally agree that the specifications most desired are 15 horsepower, four cylinders, four speeds, gate changed instead of selective type, Bosch magneto, Zenith carburetor (made in Belgium), five detachable wheel rims, low-lying style, but with a clearance of over 8 inches, and stream-line torpedo body. As Ceylon is extremely mountainous and all the resorts are located in high altitudes that can be reached only over roads having steep gradients and hairpin curves, cars should be geared to take high hills easily. There is a preference for gravity feed over pressure feed among the planters in the hill districts. Great speed is not demanded in a car, as the narrowness and excessive number of curves in the roads will not permit it to be used over any considerable stretch of country. For the same cases the wheel base of cars for this market should not exceed 115 to 120 inches. Tires preferred for 15 to 20 horsepower cars are 815 by 105 millimeters (31.7 inches by 4 inches) and three times as many of these are sold as of all others.

MILLIMETER MEASUREMENTS DESIRED—OTHER FEATURES.

One great objection to American cars is the fact that their rims are not measured in millimeters. It is believed that if American cars could be built for export with their parts standardized to the most popular sizes of the metric system a very great increase in their sale would be noticed, at least throughout the East. All valves should be of the European patterns and sizes and not American, as motor-car agents and houses here have steadily declined to keep American spares. The demand is not sufficient to make it pay. Local agents for American cars have more difficulty over the question of spare parts, both in making sales and in their subsequent efforts to keep their customers satisfied, than over any other detail. Rims should be of 810 millimeters (31.889 inches), allowing for 90 to 105 millimeter (3.54 to 4.13 inch) tires, or should correspond as closely as possible to this size.

All cars intended for sale in India and Ceylon, or the middle East generally, should be built with a special view to the accessibility of engine parts and to simplicity of design and arrangement. This has particular reference to the carburetor and magneto, neither of which are clearly understood by native engineers nor free from abuse on the part of native chauffeurs. Electric lights are appreciated if reliable and not too costly. But unless these are special features the ordinary acetylene generator is preferred for lighting.

^a The R. A. C. rating is explained in detail in a monograph, "Foreign Markets for Motor Vehicles," which may be obtained at 10 cents a copy from the Superintendent of Documents, Government Printing Office. For a single-acting cylinder with a single piston the horsepower is calculated by dividing the square of the internal diameter of the cylinder by $\frac{1}{2}$, and this multiplied by the number of cylinders gives the horsepower of the car.

All motor cars should be equipped with top, side curtains, wind shields, lamps, etc., and quotations of prices shoul invariably include these fittings. Strong top and side curtains are necessary on account of the sudden and sometimes violent rainstorms. Wood and metals used in the construction of the car must be able to withstand constant humidity and severe heat. Unenameled steel parts, steel hinges, and studs invariably rust, and spoil the car's appearance in a very short time. Cars should have large radiators and be capable of running under high temperatures without overheating.

OBJECTION TO AMERICAN FITTINGS, TRIMMINGS, COLOR, AND FINISH.

It is the consensus of opinion among motor-car dealers throughout the island that if American manufacturers would make a few small but important changes in the cars they attempt to introduce here a greatly augmented sale would surely result and an important permanent market probably be established for the future. At present a Ceylonese will buy an American car, first, because of its cheapness, which may alone enable him to own any car at all, and next because of its excellent running qualities, its powerful, noiseless engine, and its ability to climb hills. Whenever he can afford it, he invariably throws away the American fittings, hoods, and side curtains and orders English ones instead. If possible he has it repainted and changes the nickel trimmings for brass. The Singhalese dislike intensely the black bodies and black hoods, nickel trimmings, and all-metal screens which American low-priced cars now affect. A lugubrious appearance is not in harmony with the tropical sunshine and brilliant colors which his mind has associated with pleasurable things all his life. Nickel peels quickly and rusts easily in this damp climate, and it is also rapidly worn off by the vigorous polishing the native coolies give it, whereas brass is durable, brilliant, and easily taken care of.

The most important objection of all, except perhaps that relating to color, is that the American manufacturer of low-priced cars fails to give them the number of coats of varnish they need to compare favorably with even the most ordinary European car. At a good distance in the street the shrewd native buyer can pick out an American car from its European rivals by its lack of enough coats of varnish to give it the substantial finish; also by its exaggerated lines and the crudeness of its coach work. These faults do not strike the Singhalese mind as being due so much to economy in construction as to poor workmanship. No amount of high power, speed, or engine perfection can make up to the oriental for this lack of external beauty. With regard to speed and horsepower he is fairly indifferent, but he must have style. A motor car to him is not merely a thing in which to hurry across the country; it is a symbol of his place in the community, a possession to enhance his importance. Its appearance must please his eye, its fittings accommodate themselves luxuriously to his person; it must be a setting worthy of his dignity. He judges a car by its appearance first, and if he must content himself with a cheap car, the handsomest one gets his money. A few extra coats of paint do not constitute a great price to pay for the advantage of making a good first impression.

COLORS AND HOODS PREFERRED—POOR PROSPECTS FOR HIGH-PRICED AMERICAN CARS.

Cars are preferred with dark blue, dark green, cream, yellow, or French gray bodies, with khaki or gray hoods and screens framed in oak or teak with brass fittings. The importance to American manufacturers of changing the black color of their cars to brighter colors and the nickel fittings to brass for the Ceylon and Indian markets can hardly be too strongly emphasized, as both natives and Europeans greatly prefer the latter and are willing to pay considerably more for cars whose appearance pleases them than for the same car or even a superior one the appearance of which they do not like. It may be taken as axiomatic that all low-priced cars brought into this market are sold on first impressions; and if the first impression is a bad one, a sale is difficult. So strong is the belief in this district that American cars are inferior to European cars in point of style and finish that it would be a practicable impossibility to sell a high-priced American car here even if its appearance compared favorably with European cars of the same price. It is not likely, however, that there will ever be any considerable market in Ceylon for medium or high-priced American cars, as local prejudices and the ties which bind the island to the mother country are too strong to be overcome without much patience and effort.

AMERICAN LINES AFFECTED—SPEED AND HIGH POWER NOT DEMANDED.

American motor-car manufacturers probably do not realize that the nature of their goods in itself furnishes a telling advertisement for or against all lines of American manufactures. In this consular district there is a tendency to rate everything produced in America as on a par with American low-priced motor cars, and as these are widely regarded as deficient in finish and wearing qualities, other lines also suffer. If the car manufacturers could decide to make one type for home consumption and another type more nearly approaching the demands of their prospective foreign customers for export, undoubtedly much of the prejudice which exists in the Eastern markets at present against American motor cars and other manufactured articles would be removed.

The points to be remembered are that the speed and high power demanded in the United States are not demanded here, but that the appearance and comfort which the American buyer is willing to forego for the sake of speed and power are the very things which in the East reflect credit on the owner and give him a prodigious satisfaction in the possession of his car. It should also be strongly impressed upon the manufacturer that as American tires do not conform to the metric system in measurements, and as the metric system is practically standardized in its application to all European cars, it is doubtful if American tires can ever compete successfully in the East with European tires until their measurements are altered. Right-hand drive is an absolute essential, and not a single car without it could be sold locally, as all vehicles drive on the left side of the road instead of on the right as in America.

METHODS OF SALE—AMERICAN AGENCIES.

The methods of sale usually employed are advertising and personal canvassing among prospective buyers with the car to be sold. One firm which sells a number of American cars has found that its best method was to insert semiweekly quarter-page advertisements with attractive cuts and prices in the daily newspapers. The low prices attracted persons who otherwise would never have thought of buying a motor car. The personal canvassing system has not been tried extensively outside the Colombo district, and it is believed that if an American firm should become sufficiently interested in this market to employ American canvassers the results would be satisfactory.

There are six American motor-car agencies in the island, at least four of which are doing a successful business, but in only one case is there any attempt on the part of the agents to devote more than a small part of their time to the sale of motor cars. The newest of these agencies has gone into the matter on a large scale. It has leased a property and put up a repair garage under the management of a skilled European mechanic with a number of native mechanics that work under his direction. Heretofore there have never been any thoroughly competent repair shops under European management in the island, the reason being that all garages have had to depend upon native mechanics who, though often clever, are irresponsible and careless. This firm has a resident manager and a salesman here who intend to devote their whole time to the sale of one line of American cars. While the plant is still in the experimental stage the results have been promising and the plan is being watched by other motor-car agencies with a good deal of interest.

SALES DETAILS—INCOMPETENCY OF CHAUFFEURS.

The greater number of cars are undoubtedly sold by the general importers who conduct agencies, but this is principally because they handle several of the most popular makes, both European and American. The setting up of establishments strictly for the motor-car business is a matter of recent development. It has been largely brought about by the high prices charged for repair work and the unsatisfactory character of the repairs made in workshops attached to general import firms. Practically all cars are sold on the commission basis, commissions ranging from 10 to 25 per cent of the f. o. b. cost price, according to the number of cars ordered. Each car is sold complete with body, tires, lamps, hood, and all accouterments, as there are no shops here that can manufacture bodies to fit the chassis. Cars are usually packed in strong wooden cases and are set up complete. Until sold they do not have to pay a municipal license, but are granted what is called an importer's license.

The garages stock repair parts according to European standards, and this is one of the great causes of the difficulty in selling American cars. With a few exceptions Burghers and Eurasians are employed as chauffeurs, though occasionally a Tamil rickshaw coolie is promoted to the glory of driving a motor car. The chauffeurs are rarely mechanics and never learn much about their car beyond a reasonable control of it on the road and how to keep it oiled and clean. In cases where the chauffeur does possess mechanical knowledge his wages are

correspondingly high, and he must be provided with a special coolie to do the cleaning and oiling. Much of the complaint against motor cars here and many of the faults they develop may be traced directly to the incompetency of the chauffeurs. At the same time it must be said that some of them drive with remarkable skill and daring, their lack of training being manifest only in their carelessness as to preserving the life of the car. A skilled driver commands \$25 to \$35 and even \$50 per month, but many motorists employ a boy for \$8 to \$10 per month who looks after the car and drives it only when the owner does not care to drive it himself.

FEW CARS IN STOCK—INSTALLMENT PLAN—FUEL—ROADS.

It is not customary for any garage to keep large stocks of cars on hand, especially if it has the agency for several different makes. One garage now has four American cars in stock and another six. The agents for the English and European cars have rarely more than one or two, which are used principally for demonstrations.

Recently a new American agency has undertaken to sell a few cars, as an advertising expedient, on the installment plan. So unreliable, however, is the native buyer where credit is involved that it has been found necessary to arrange apparently severe terms. The cars are sold for one-half the purchase price down, the remainder to be paid in five equal monthly payments with interest at 10 per cent a month.

There are two important oil companies, American and Asiatic, which supply liquid fuel to Ceylon, and they divide the market between them. Both charge the same prices for gasoline, or petrol, as it is called throughout the island. The price to the ordinary motor-car owner is 33 cents per gallon at Colombo and 65 cents per gallon throughout the rest of the island. To the trade, however, and to a favored few who possess secret agreements, gasoline is supplied by the great importing houses at a net cost of 25 cents per gallon. The great increase in the cost in districts outside of Colombo is due to the difficulties of transportation and storage.

Except for the steep grades in the mountainous central part of the island, Ceylon scenery and roads form together a motorist's paradise. There are over 4,000 miles of road traversable by motor cars, and the greater part of this is superior to roads in the rural districts of most American States, while the scenery is everywhere green and beautiful and the climate delightful for motoring. North of Colombo 125 miles the mountain system that forms the core of the island comes to an end, and the northern and eastern portions are like the low country around Colombo—practically flat. But those very mountain ridges, lying 160 miles north and south from Anuradhapura Matara, and 100 miles east and west from Colombo to Badulla, form the most prosperous and populous sections of the island. They contain the principal tea and rubber plantations and a large part of the coconut acreage. The planters on the great estates which stretch over these mountains have come to depend more and more upon motor cars for pleasure and for communicating with each other. Rinderpest and the foot-and-mouth disease are making transportation by horses or bullock cart impracticable. In addition to a growing tendency to experiment with motor trucks in hauling products from estates to warehouses and shipping docks, planters are more and more taking up motor cars for family use.

CUSTOMS DUTIES AND TAXES.

The customs duty on motor vehicles and parts is $5\frac{1}{2}$ per cent ad valorem. Municipal taxes are payable on the 1st day of February in each year and are according to weight, as follows:

Not exceeding 1,120 pounds, unloaded, \$6.50; from 1,120 to 1,680 pounds, unloaded, \$8.10; over 1,680 and not over 2,240 pounds, unloaded, \$9.75; over 2,240 pounds, unloaded, \$11.35.

When cars are to be let for hire the license taxes are double these rates. On motor cycles the yearly license is \$1.60; on tricycles, including tricars, \$3.25. Motor lorries of over 2 tons weight, unloaded, pay a municipal tax of \$22.70 per year. Every person driving a motor car must procure a chauffeur's license, for which he is charged 80 cents, and in order to secure this license he must furnish a letter to the municipal council from some expert driver who certifies that the applicant is well qualified to drive a car. He must give such further assurance as may be necessary to satisfy the council of his ability. It will be seen that the taxes are not based in any instance on horsepower.

OTHER VEHICLES—MOTOR CYCLES.

The 1912 figures for vehicles in Colombo are as follows: Carriages, 186; rickshaws, 3,494; hackeries, 226; bullock carts, 3,146. No figures for the numbers of these vehicles throughout the island are available. The annual municipal taxes for private vehicles are as follows: Bicycles, \$0.97; carts, \$1.30; hand carts, \$1.30; rickshaws, \$0.81; carriages, each horse, \$0.81; hackeries and carts, each bullock, \$0.32.

There are a number of motor-cycle agencies here, and it is probable that at least 1,000 motor cycles are in use. The two most popular makes are the Triumph, an English machine, and the Indian, an American cycle. Aside from the Indian, most of the motor cycles sold are of English manufacture, though one French and one Belgian machine have lately entered the market, and the latter, through vigorous pushing, has achieved considerable popularity. Within the past three months three American makes of motor cycles have been taken up by agents here, and recently inquiries have been made at this office concerning another make. A large local firm is contemplating taking the agency. If the same amount of time and salesmanship were devoted to these American machines as to the English motor cycles there can be little doubt that a satisfactory market would result. Many young Europeans and Burghers whose incomes do not permit them to think of motor cars are much interested in motor cycles.

The cheapest motor cycle in the market retails at present for approximately \$287.50. The prices for other grades are indicated in general by the retail prices asked for the following: Triumph, $3\frac{1}{2}$ horsepower, \$335, 7 horsepower, \$382; Indian, $3\frac{1}{2}$ horsepower, \$335, 7 horsepower, \$382; Singer, $3\frac{1}{2}$ horsepower, \$297, 7 horsepower, \$347; Humber, $3\frac{1}{2}$ horsepower, \$312; 7 horsepower, \$362.

TAXICABS—REGULATIONS FOR MOTOR VEHICLES.

A London and Calcutta firm and an energetic motor-car agency in Ceylon have organized the Colombo Taxicab Co., which is introducing a taxicab service in Colombo. All the 20 automobiles to be put into immediate use are of American manufacture. Planters from the outside districts and a great number of passengers in the tourist season will supply most of the patronage, though the local residents may be expected to welcome an efficient taxicab service in place of the ever-uncertain rickshaw coolie.

The present by-laws of the municipality of Colombo provide that all mechanically propelled vehicles must be registered and furnished with a number in white letters on a black background, which must be carried conspicuously on the vehicle and illuminated at night. Motor cars must carry at least two headlights, two sidelights, and a red tail light. Drivers must invariably keep to the left and blow their horns when approaching any person or other vehicle. Right-hand drive on motor cars is not prescribed by law, but is absolutely essential. In ordinary cases a first offense against any of these laws is punished with a fine of \$16.22 and a second offense with a fine of \$32.44.

DEMAND FOR MOTOR TRUCKS.

Owing to heavy mortality among the bullocks used for transporting plantation products in Ceylon, due to rinderpest and foot-and-mouth disease, a revolution seems to be impending in the mode of transportation in this island, in the substitution of motor trucks, or lorries, for the picturesque but slow and cumbersome bullock carts which for centuries have been the chief means of conveying goods in Ceylon. Up to the present, Government regulations in regard to the use of motor lorries on the roads of the island have been so severe and restrictive as practically to prevent their use, but owing to the extreme necessities of the present situation the Government seems now prepared to relax these regulations and also to embark on a comprehensive policy of widening roads and building stronger bridges for the express purpose of making it safe to abandon bullock carts in favor of motor lorries.

LOCAL AUTHORITIES REGARD USE OF MOTOR TRUCKS IMPERATIVE.

The secretary of the Ceylon Planters' Association, at Kandy, says that, in his opinion, within a very few years hundreds of motor lorries will have been imported into Ceylon, and that bullock carts will almost entirely disappear from the roads of the island. He says that there are now unusually favorable opportunities for manufacturers of motor lorries to introduce them into Ceylon and that expenditures for them will undoubtedly be enormous, as almost all of the plantation owners show an eagerness to purchase them as soon as there is relaxation in the Government regulations. The necessity, he says, is so great that they will be purchased no matter what they cost. The first lorries to establish a favorable reputation for meeting the special conditions of the island will have the best sale.

That American manufacturers of motor lorries may appreciate the serious conditions in Ceylon, which will necessitate the introduction

of motor transportation, at a meeting of the Morawakorale Planters' Association a letter was read from the forwarding agent for all estates in the district, who said that it was impossible to carry on transport work any longer. He said that he had gone over to India and purchased cattle for his business, but many of these had been attacked by foot-and-mouth disease while in quarantine, and this, combined with the difficulty of hiring carts locally, had decided him to give three months' notice to terminate his contract.

At a meeting of the Maskeliya Planters' Association the chairman, in his remarks, said:

Rinderpest, anthrax, foot-and-mouth disease, or some other cattle disease is prevalent in nearly every district of Ceylon, and the vital interests of every shareholder in the island are at stake. The cost of running a motor lorry works out roughly at 25 cents per ton-mile as against 19 cents per ton-mile for bullock carts, and no one would object to paying the extra 6 cents per ton-mile were he assured of regular delivery of his produce and requisites. Something must be done. The time for talk and inaction has passed and we must tackle the question.

TYPE OF TRUCKS SUITABLE FOR CEYLON.

The report of the delegates from Ceylon to the Imperial Motor Transport Conference, held in London in July and August, 1913, covers an account of the Imperial Conference and of the Commercial Vehicles Exhibition at Olympia, with descriptions of the commercial vehicles shown there. A number of details of these vehicles which would be objectionable for Ceylon use are mentioned, among them unguarded or ineffectively guarded final transmission chains; transmission shafts too light to insure immunity from bending or damage from flying stones, etc.; radius rods insufficiently strong; faces of gear wheels too narrow; brake work too light; radiators insufficiently insulated from vibration and consequently likely to leak; exhaust pipes and circulating water connections too small in diameter.

The report gives the following points which the delegates believe should be embodied in the type of lorry most suited to the effective loads and normal working conditions in Ceylon: (1) Final drive to road wheels by chains running in proper cases for lorries carrying 2 tons net load or upward; (2) type of change-speed gear to be such as leaves as little as possible dependent on the skill of the driver; (3) carburetor suitable for effective working with kerosene, or in due course with alcohol also; (4) radiator efficiently insulated from road shocks and engine vibration; (5) the provision of some type of winding drum for getting the lorry out of difficult situations.

For light loads of 1 to 1½ tons there can be no objection to the use of worm drive and live back axle, but for loads of 2 tons and upward the general opinion among experts and users is distinctly in favor of the chain. Wheels may be of either steel or wood to suit the requirements of users, and there is considerable latitude in the selection of solid rubber tires. The report urged that the restrictions on the use of motor lorries in Ceylon be made more liberal, as "the existing Ceylon regulations are so much more exacting than those of any other part of the empire that a special type of vehicle, costly and relatively inefficient, is required to comply with them."

KIND OF VEHICLE DEMANDED BY LOCAL CONDITIONS.

The motor lorries which American manufacturers provide for the Ceylon market should be safe to use on narrow roads with frequent sharp turns through mountainous country having very steep grades to climb. There are so many "blind corners" where traffic may be suddenly met and would be difficult to pass that reliable steering apparatus and brakes are necessary, and the narrowest lorry consistent with good power and fair load capacity is most to be desired. Especially must it be capable of being turned within a circle of very short diameter. The present regulations do not permit motor lorries that can not be turned entirely within a circle 40 feet in diameter, but it is likely that this regulation will soon be modified. In connection with conditions in Ceylon it must also be borne in mind that there are sudden changes in climate within very short distances, owing to the differences in elevation above sea level and to the fact that many districts have an extremely heavy rainfall, while in other districts a few high hills on one side shut off the prevailing winds bringing rain. It is therefore possible to go, within a very short distance, from tropical to temperate climates and from very wet weather to very dry weather. Thus a great deal of attention should be paid to the prevention of carburetor difficulties. The coconut and rubber plantations are in low districts, but the tea plantations are chiefly at elevations of 1,500 to 7,000 feet.

It must be confessed that the American motor-truck catalogues so far received in Ceylon hold out little encouragement for the sale of American trucks in Ceylon. The English trucks seem to be lighter and less expensive. A truck with a capacity of 2 tons and a gross weight of not over 4 tons is most in demand at present. But it should be very strongly made, because the estate roads are not so fine as they have been said to be. Trucks should be supplied with the taxicab wheel lock and have a road clearance as much over 8 inches as possible. Under the present regulations their width over all should not exceed 5 feet 6 inches, and they should be limited in speed potentiality to 12, or at most 14, miles per hour. Only by some such provision can a limit be put to the capacity of the native driver to do damage to himself and his load. The wheel base should be as short as possible, the back tires twin, and all tires solid. An engine of 25 to 30 horsepower, R. A. C. rating (not American rating), is sufficient for all purposes.

PRICES AND COST OF UPKEEP.

It is practically useless to attempt to sell a motor truck in this market which can not be landed here with all charges paid, except duty, for at most \$3,300. One English firm advertises an 18-horsepower (R. A. C. rating) lorry capable of carrying 25 hundredweight (hundredweight = 112 pounds) for a little less than \$2,000. Another advertises a 30-horsepower, 2-ton model for \$2,650, and another a 5-ton motor lorry with all tires, etc., complete, for \$3,387. This last is much too large for Ceylon use, but it is an excellent example of what the English manufacturers offer. In the specifications which accompany the circulars advertising this lorry information of great value to the planter is given relating to the working costs.

Every planter, when looking at a catalogue setting forth the specifications of a truck, is interested in knowing what it will cost him to run it even more than he is in the specifications of the gear box or the size of the radiator. For the information of the American manufacturer is given the following estimate of working costs and running expenses for a Straker-Squire 5-ton van doing 300 miles per week, as furnished to the planters by the manufacturers in their circulars:

Item.	Amount.	Item.	Amount.
Petrol, at 32 cents per gallon.....	\$13.94	Insurance, at \$72.99 per annum.....	\$1.40
Oil, grease, and cleaning materials.....	1.13	Interest on outlay, at 5 per cent.....	.35
Tires, at about 3 cents per mile.....	9.11	Driver's wages.....	8.51
Maintenance, at 2 cents per car mile.....	6.07	Garage.....	.97
Depreciation, at 15 per cent on chassis price.....	9.11	Total.....	53.89

This is equivalent to \$0.18 per car mile, or \$0.036 per ton mile. From this calculation the planter not only knows when he buys what the initial cost of his car is going to be, but he knows precisely, as experts have figured it out for him, what it is going to cost him for upkeep and running expenses. At present a strong effort is being made by English makers of motor trucks to deliver a truck capable of carrying 4,500 pounds load at Colombo with all charges paid except duty for \$2,600 to \$2,750. There is little doubt that this will become the popular price for the 2-ton lorry, and there will be a market here for 3-ton and 4-ton trucks at relative figures when the Government has improved Ceylon roads sufficiently to accommodate this heavy traffic.

OPPORTUNITY FOR AMERICAN LIGHT CARS.

American manufacturers should have no difficulty in competing successfully with the English types which have been introduced, and there is promise of a considerable business for the manufacturers who can get into the market with a light and moderate-priced vehicle. The following extract from a letter from a firm of consulting and visiting estate engineers of Colombo may have some interest for American manufacturers:

The cost of bullock transport has increased so much of late, owing to disease and other causes, that planters have become convinced of the necessity of power traction. The conditions obtaining in the island are peculiar, and so far no truck has been designed to comply with them. One of our men is a member of the British Institution of Automobile Engineers and he has had a large experience in auto-truck design and manufacture. To assist manufacturers we would supply a detailed report on local conditions, together with a full specification for the kind of machine required. Our charge for this would be \$150. Or, if preferred, we would criticize in detail any designs submitted to us and point out what alterations would be necessary to meet the conditions here.

FURTHER REQUIREMENTS—GOVERNMENT REGULATIONS.

Motor lorries for use here should be arranged so that wooden tea cases can easily be piled up in them and covered with tarpaulins and should, in fact, be capable of carrying almost any kind of goods. Owing to the intense sunlight, Ceylon being only about 6 degrees

above the Equator, some covering is always necessary to prevent damage from overheating. The construction of the lorry should be as light as is consistent with strength, owing to the Government regulations as to weight of load allowed. To show features of motor lorries, which should be specially taken into consideration by manufacturers, I present the regulations of the Government with regard to them, although some modifications in these are expected. A conference between Government officials and the Ceylon Chamber of Commerce over the matter was held in April, the latter body urging especially a more generous allowance as regards width of lorry and load to be carried and some increase in the speed limit. The present regulations follow:

The use of lorries is allowed only on such roads as the Governor, by notification in the Government Gazette, shall declare are suitable for use by lorries.

When the Governor has declared any road to be suitable for use by lorries, lorries may be used thereon on the following conditions, namely:

The extreme width of the lorry shall not exceed 6 feet and 6 inches.

The load on any one axle shall not exceed 3 tons.

The weight of the lorry and load shall not exceed 6 tons.

No lorry shall be driven at a speed exceeding 6 miles an hour.

The diameter of the back wheels, measured over the tires, shall not be less than 42 inches, and the diameter of the front wheels, similarly measured, shall not be less than 36 inches.

Every lorry shall be so constructed as to be capable of being turned entirely within a circle of 40 feet in diameter.

The wheels of every lorry shall be fitted with solid rubber tires.

The use of tractors and trailers on any road in Ceylon is prohibited, except in such cases as the Governor has given or may hereafter give special permission for the purpose, and in each case the conditions, subject to which the use of tractors and trailers is allowed, shall be published in the Government Gazette.

PROPOSED GOVERNMENT MEASURES.

In an interview with the Director of Public Works for Ceylon as to the future policy of the Ceylon Government in meeting the wishes of the Ceylon planters who desire to adopt motor transport, I was told that the present restrictive regulations are to be relaxed just as soon as the roads of the island can be made sufficiently safe to do so. It is the intention gradually to increase the width of all the roads owned by the State Government from the present 14 feet to 16 feet and the width of the metaled portion from 10 feet to 14 feet. At present many of the bridges are not safe for a load of over 6 tons, and it is proposed to strengthen them to permit much larger loads. During the last five years about 2,000 steel bridges have been built, and the new Budget for 1913 provides for an appropriation of \$210,000 for new bridges and for repair and improvement of present bridges. Also during the next year the sum of \$242,000 is to be spent on the widening and improvement of State and \$170,000 on the construction of new roads. The Government has just gazetted 20 important State roads, previously closed to motor lorries, as open to motor-lorry traffic under existing regulations. The Government has also been giving much attention recently to the study of the different makes of motor lorries, to ascertain which ones will be safe, and suitable for Ceylon roads, and has imported one motor lorry from England for making tests on local roads.

CITY USES OF MOTOR VEHICLES—OPPORTUNITY FOR AMERICAN MANUFACTURERS.

Not only for use in connection with the transportation of plantation products does a large increase in the future use of motor lorries seem probable, but also for city delivery and transportation of supplies, especially in Colombo. For instance, the Government budget for 1913–14 provided for an appropriation of about \$22,000 as initial cost of a fleet of motor mail vans with the necessary garage, etc., for the Colombo mail service. The leading hotels of Colombo use motor vans for transporting the baggage of their patrons between the hotels and railway stations and steamboat wharves. It is evident to anyone who has noticed the bullock carts in use in Ceylon, which under the best conditions do not travel over 2 miles per hour and can not carry over 3 tons full weight, that there is a most favorable opening in Ceylon for the introduction of motor lorries for all sorts of purposes, and it behooves American manufacturers to make arrangements without delay for securing a fair share of the large business impending. A considerable number of motor-car firms and firms dealing in engineering requisites for Ceylon plantations will be eager to take on agencies for really serviceable cars.

GROWING SALE OF AMERICAN PLEASURE CARS.

In the sale of small cheap cars for personal transit in Ceylon American manufacturers are rapidly increasing their business here. Most of the plantation owners live at considerable distances from railway stations, and where the condition of the road permits it there is a growing disposition to buy motor cars. Usually the owner of a plantation is well able to afford a good car, and companies operating rubber and tea estates seem always willing to provide their plantation superintendents with cars when conditions are practicable for their use. There is, however, still considerable prejudice against American cars, the chief complaints being that the steering gear is not sufficiently reliable for the great number of sharp curves on the narrow roads and that there are too often carburetor difficulties, due to the rapid climatic changes. The average Ceylon planter likes a roomy car that will hold a good deal of baggage and the bulky purchases he makes in town. The question of expense does not seem to enter into his calculations so much as general convenience, safety, and reliability in traveling over the difficult roads.

ROADS OPENED TO MOTOR TRAFFIC.

There were 3,925 miles of public roads in charge of the Public Works Department, most of which were opened during 1913 to traffic for steam lorries and motor trucks. The Government engineers have stated: "The rapid development of motor traffic throughout the island and the gradual but certain substitution of mechanical transport for the bullock cart have set up conditions which necessitate wider and better roads and a greater amount of attention and care on the part of those in charge of them." The roads which will be chiefly affected by the use of motor trucks or mechanical transport generally are those in the Western, Central, Southern, Northwestern,

Uva, and Sabaragamuwa Provinces, some 2,000 miles in all. Most of these roads run through mountainous or hilly country, where grades are very steep, so that motor trucks specially designed for narrow roads and hill climbing are essential. The Government has already permitted the use of motor trucks of a gross weight of 6 tons each on 18 roads and up to 3 tons each on 44 roads.

This increased mechanical transport has demanded the use of steam rollers, and there are 50 of these now used in the island. The Government proposes to increase the number at the rate of 12 a year until there are sufficient steam rollers available for the repair of all metaled roads. These and similar machinery are purchased through the Crown agents in London.

AMERICAN OILS.

Kerosene is much the most important export from the United States to Ceylon. For the calendar year 1913, kerosene oil in gallon cases, to the amount of 1,117,569 gallons, valued at \$267,062, was imported into the island, the United States sending 1,108,981 gallons, valued at \$265,777. The total amount of bulk oil imported was 3,575,797 gallons, valued at \$406,030.

Ceylon now imports large quantities of liquid fuel oil or crude petroleum from Borneo, the imports for the year ended December, 1913, amounting to 5,187,700 gallons, valued at \$174,325. The report of the Planters' Association of Ceylon, for 1912, mentioned the inconvenient effects to rubber and tea planters of the increasing price of this fuel, and it states that the necessity for an inquiry into the cause of the enhanced price of liquid fuel seems indicated, as the supply of this at present appears to be monopolized. It mentions that as firewood is being rapidly exhausted and displaced by liquid fuel for drying and motive purposes, a regular and cheap supply is therefore of the greatest importance to both tea and rubber producers. The chief cause of the increasing cost of this liquid fuel is explained by local dealers to be due to the refineries finding valuable by-products contained therein.

Ceylon also imports large quantities of lubricating oil for machinery. The total imports in 1913 amounted to 249,195 gallons, valued at \$83,185, of which the United States supplied 150,376 gallons, valued at \$36,732, other countries supplying such oil being the United Kingdom, Burma, Belgium, Germany, and Italy, in the order named. There is also a large use in Ceylon of what is known as petrol (gasoline), especially used in connection with the increasing motor-car traffic. Out of 383,442 gallons of petrol supplied to Ceylon in 1913, valued at \$152,852, the United States supplied 3,960 gallons, valued at \$1,622. The chief source of supply of this oil was Borneo.

The American oil business in Ceylon is a considerable source of help to the export of other American articles to this market for the reason that ships which are chartered mainly to carry such oil from New York to Colombo also take as cargoes considerable general merchandise which would otherwise have to be shipped at higher cost to England and then to Ceylon, with the inconvenience of transshipment in England. In fact the general-merchandise freight from the United States to Ceylon is in large measure dependent upon the oil business, and the more frequent the departure of oil ships, the more expedition there is in the shipment of general merchandise to Ceylon.

MARKET FOR FRESH FRUITS.

[By Consul Charles K. Moser, Colombo.]

Undoubtedly within the past two years Ceylon has given evidence of an increased demand for fresh fruits of the temperate zones. The local importers declare that they are unable to procure a sufficient quantity of plums, grapes, apples, and pears in good condition to supply the demand. It is a local fiction that nearly all the apples seen on the local market are from Australia and that the remainder are English apples. As a matter of fact, Australia provides the greater quantity, with Italy second, and the United States third. The imports officially credited to the United States, however, are smaller than its actual share, as it has been proved beyond question that nearly all the apples imported from the United Kingdom and from Japan are really American apples shipped via Liverpool and Yokohama, respectively, instead of direct.

On account of the climatic conditions in Ceylon and the conservatism of buyers, all fruits sent to this market must be sent on consignment. The local buyers are unwilling to buy on order and take the risks of decay en route. They declare that there is a good market for American apples, shipped direct, provided they can be delivered in good condition, retaining their appearance and flavor. The question of price is not important, as Ceylon fruit lovers will willingly pay from 35 cents gold to 75 cents and even \$1 per dozen for choice, well-flavored, and well-appearing apples. Australian apples lack the flavor and also the appearance of the best American apples, but the experience of Ceylon importers has been that they are more carefully packed and keep better.

Lately the shipments of American apples have largely been from California via London. In some instances the apples were called California pippins and in others Newtown pippins, whereas the fruits received were mostly Bellflowers, which owing to lack of cold storage failed to keep well in transit. The great difficulty with shipments direct from California is that there are no cold-storage boats via the Pacific Ocean, and the only line between the United Kingdom and Ceylon equipped with cold storage is the Orient Line; but this line will only carry foreign products in cold storage when it has no cold-storage cargo for Australia. Its prices are also prohibitive, the charge being \$48.67 per ton of 40 cubic feet from Liverpool.

PACKING—BEST SALES SEASON.

Apples intended for shipment to Colombo should be wrapped in tissue paper and packed separately in boxes containing 40 pounds, or about 1 bushel each. Packed in barrels they will inevitably perish through the long travel and the excessive handling. Preferably shipments to Colombo from the eastern parts of the United States should come via Liverpool, to be transshipped by the Bibby Line, which sails every fortnight from Liverpool to Colombo. If western apples, they should be shipped from San Francisco or Vancouver with transhipment at Hongkong.

The best time for the sale of apples in Colombo is from September to March, when the Australian apples are not in the market. Apples shipped on consignment to Colombo are sold for the best prices they

will bring and proceeds remitted to the consignor, less 10 per cent commission. There is no customs duty on the importation of fresh fruit. Local importers express great eagerness to get into correspondence and make best arrangements possible with American shippers of apples.

MARKET FOR PLAYING CARDS.

[By Consul Charles K. Moser, Colombo.]

By far the largest imports of playing cards into Ceylon are from Belgium, that country having practically a monopoly. The imports in a recent year were as follows: From Belgium, 3,600 gross packs, valued at \$9,313; from Germany, 700 gross packs, valued at \$1,790; from the United Kingdom, 370 gross packs, valued at \$1,030; from the United States, 29 gross packs, valued at \$390.

The finest cards come from the United Kingdom and the cheapest from Belgium. Most of the cards used by the general public are of the cheaper variety, while those used by Europeans are gilt-edged cards of high polish and fine finish, made in the United Kingdom, Germany, or the United States. A large quantity of cards is distributed throughout the country for advertising purposes by agents of liquor manufacturers. In hotels, clubs, and other public places it is customary to charge Europeans 3 rupees (about 97 cents) for a pack of good cards. In the retail shops they may be had for 50 cents. Cheaper cards are to be had for 15 to 25 cents a pack.

The cards used by Europeans are of the best quality, and the cards sold to the native population are similar in material and finish to those sold in the United States for 25 cents a pack.

TEA CULTIVATION.

Tea cultivation is the greatest source of prosperity to the island of Ceylon, the total value of tea exports approximating over \$25,000,000 per year. Several hundred companies are engaged in tea cultivation in this island, nearly all paying dividends of upward of 7 per cent on their capital stock and some up to 40 per cent, and also there are about 1,500 private plantations, many of which, however, especially in the lowland districts, grow more rubber than tea.

Good tea land at an elevation of 2,000 to 4,000 feet sells for \$500 an acre or over, and capital invested in land at such prices can be made to yield 7 per cent, with comparatively little risk. Although a few years ago, at the height of the rubber boom, it appeared as if the tea industry of Ceylon might become subordinate to that of rubber, yet there is now a reaction from such tendency, especially during recent months, since the price of rubber has shown a declining tendency. Many plantation owners who several years ago, especially in the lowlands, were growing both tea and rubber and were concluding to devote their lands solely to rubber have more lately decided that tea affords more promise of steady and safe profits.

SEPARATION OF TEA FROM RUBBER.

It is likely, however, that there will in the future be less planting of tea and rubber together, as the two do not seem to grow particu-

larly well, the rubber trees as they develop killing out the tea, and it will probably become more recognized that in all the upland districts tea is the best crop to grow, while in the lowland districts especially suitable for rubber there should be no attempt to cultivate tea. The higher the altitude in Ceylon the better the tea thrives and develops in flavor. Most of the tea is grown at elevations of 1,500 to 5,000 feet. There is considerable Government land in Ceylon at elevations of 5,000 to 7,000 feet, now covered with jungle, which might be turned into profitable tea land, except that it is a policy of the Government to conserve such areas to prevent any deforestation such as might unfavorably affect the rainfall of the lower districts.

A visit to the tea districts of Ceylon, such as I have just taken, must forcibly impress one with the magnitude of this industry and the immense financial returns from it. These plantations are not only yielding returns in dividends to outside capitalists, chiefly in England, of highly satisfactory amounts, but more and more they are enriching local people whose investments in Ceylon are considerably increasing, and who are now seeking additional fields for investment of capital in tea and rubber plantations in other tropical regions, especially in the Malay Peninsula, Java, and Sumatra.

TEA ON STEEP MOUNTAIN SIDES—COOPERATIVE PLANTERS' ASSOCIATION.

Almost every acre in Ceylon suitable for tea, except on Crown land withheld by the Government, is now closely cultivated with tea or with other suitable crops which can be conveniently raised incidentally with tea, such as cardamoms, cinchona, pepper, etc. As already mentioned, it is now being found that in the best tea districts it is not a wise policy to raise rubber also.

The highland tea-growing sections are all very mountainous in character, yet this does not seem to interfere in the least with the tea cultivation, and I was amazed to notice hundreds of coolies weeding, pruning, and plucking the tea plant on slopes so precipitous that it seemed almost incredible that they could retain a footing. But the men, women, and children engaged in this work, with their feet bare, seemed to find an easy hold on slopes where a white man wearing shoes might easily slip and fall hundreds of feet. Except for a certain amount of land that must necessarily be reserved for roads, pathways, and drainage channels, there is none that is not utilized in cultivation.

Most of the tea estates are between the town of Kandy, the ancient capital of Ceylon and famous for its Buddhist temple, about 75 miles from Colombo, 1,700 feet above sea level, and Newara Eliya, on a plateau over 6,000 feet above sea level. Kandy is the headquarters of the Ceylon Planters' Association, which is a powerful factor in attending to the needs of planters where cooperative action is desirable, especially in obtaining coolie laborers from southern India. It has a membership of nearly 1,200 estates.

THE LABOR SYSTEM.

The great requisite of successful tea cultivation in Ceylon is a plentiful supply of cheap labor. Generally speaking, it takes 300

coolies to work 400 acres, or, as expressed to me, "three-quarters of a coolie to an acre." The men, who are employed chiefly at manuring, draining, pruning, and weeding, get about 11 cents a day American money, and women and children, who are chiefly engaged in plucking the young tea leaves, get about 8 cents a day American money, this being the average, although their earnings depend on quickness in piecework. The recruiting of coolies from southern India requires much attention, over 70,000 being imported each year for the plantations by what is known as the "tin-ticket system," the coolies, after being engaged by agents of the Planters' Association, being supplied with tin tickets which entitle them to transportation and food on the way direct to the estates, the Ceylon Government arranging for their forwarding and care en route and charging the costs to the planters to whom the coolies are consigned. Should cholera or other diseases break out while on the journey, or if they were recruited in infected districts in India, they are kept for a considerable time by the Government in detention camps before being allowed to go to the plantations. The chief food of the coolies on the plantations is rice, which costs them about \$1.50 per month, and coconuts, about \$0.45 per month. A long, low building divided into small rooms, known as the "coolie lines," are supplied for the residence of the coolies on each estate.

COST AND SUPPLY OF FERTILIZERS.

Next to the cost of labor, the cost of fertilizers is an element of expense in tea culture. About 1 ton of good fertilizer is required for every 3 acres, or about a quarter of a pound for each plant. The fertilizers are composed chiefly of groundnut cake, castor cake, blood meal, sulphate of ammonia, steamed bones, sulphate of potash, and muriate of potash. The fertilizing materials cost mostly between \$40 and \$50 per ton. They are put up at factories in Colombo, the ingredients coming chiefly from India and Germany, and the business being all controlled by German firms at Colombo. Generally speaking, tea can be produced in Ceylon, according to favorableness of locality, for about 8 to 10 cents per pound, while the average price for which it sold at local auctions during 1912 was about 15 cents per pound American money. The profit is thus considerable. On many estates it is easily 100 per cent.

It will be noticed from the table that Ceylon is principally a black-tea country, with the United Kingdom by far the most important customer for black tea, while Australia, America, and Russia come next in the order named. In the minor specialty of green tea the United States is the best customer. It is explained in the last green-tea report of the Ceylon Planters' Association that there was a decrease during 1911 in the quantity of green tea taken by the United States, which was the result chiefly of the new American regulations debarring the entry of artificially colored or polished teas, but that now since the Ceylon trade has become accustomed to the altered conditions, there is evidence of an increased demand for "natural leaf" green tea and prospects are good at present for increased business in this line.

MANUFACTURING PROCESSES.

The method of manufacturing tea in Ceylon from the green leaf includes four distinct processes, known as withering, rolling, fer-

larly well, the rubber trees as they develop killing out the tea, and it will probably become more recognized that in all the upland districts tea is the best crop to grow, while in the lowland districts especially suitable for rubber there should be no attempt to cultivate tea. The higher the altitude in Ceylon the better the tea thrives and develops in flavor. Most of the tea is grown at elevations of 1,500 to 5,000 feet. There is considerable Government land in Ceylon at elevations of 5,000 to 7,000 feet, now covered with jungle, which might be turned into profitable tea land, except that it is a policy of the Government to conserve such areas to prevent any deforestation such as might unfavorably affect the rainfall of the lower districts.

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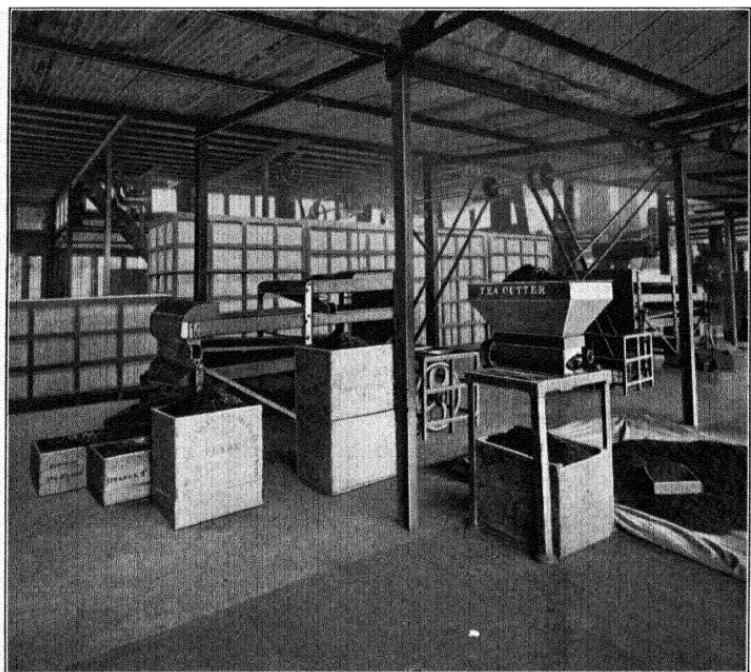


FIG. 23.—FACTORY SCENE SHOWING TEA BREAKER AND SIFTING MACHINE.

messing, and firing. In withering the tea, the leaves are placed on shelves made of wire or jute hessian very loosely woven so that the air can pass freely through it. Sometimes, in wet weather especially, this operation is aided by the use of fans. After withering, the tea is put through rollers to squeeze out any remaining moisture and to give the leaf a good twist. It is next put through roll breakers to break up the balls or lumps into which the leaves have formed, and at the same time to sift out any dirt and also to separate the small fine leaves by means of wire mesh on to a cloth placed below to receive it. The leaves are then spread out on wooden frames and covered with wet cloth to induce fermentation until a bright copper tint is obtained, but when green tea is required the fermentation is checked before any change of color takes place.

The tea is then transferred to wire trays, which are pushed into desiccators through which a current of hot air passes from 210° to 220° F. It is then cooled and afterwards sifted out into various grades. The ratio of green leaf to "made tea" works out at about 4,200 pounds of green leaf to 1,000 pounds of manufactured tea. The tea is then packed by machines into cases made of momi wood imported from Japan and lined with lead paper or aluminum imported from England and is then ready to be transported to Colombo for sale at public auction by the brokers of that city to representatives of foreign firms.

MACHINERY AND FARMING TOOLS.

All the appliances and machinery used in manufacturing tea in Ceylon are imported from the United Kingdom, and as the planters seem well satisfied with them and see no opportunity for improvement, it is natural to expect that the United Kingdom will continue to supply all the mechanical requisites necessary. Tea cultivation is all done by hand, no tools being used by the coolies except forks in fertilizing and knives for pruning, which are imported from England.

While there does not seem to be much, if any, opportunity for American machinery to be used in tea manufacture, and none has ever been brought to the notice of Ceylon planters, yet it is obvious that the highly prosperous condition of the Ceylon planters as a class suggests a good purchasing power for many American articles of comfort and luxury. American manufacturers of aerial cableways should take advantage of the present desire of tea planters in mountainous country to obtain the most up-to-date facilities for handling and conveying tea, firewood, rice, and other supplies in connection with estate operations.

POWER MACHINERY, PUMPS, ETC.

Most of the plantations have their machinery operated by water power, which is plentiful all through the tea country, usually not more than 25 to 50 horsepower being required. All such hydroelectric machinery is imported from the United Kingdom, but there seems no reason why this might not be supplied by the United States whenever new equipment is desired. As water power can not be depended upon all the year round, oil and gas engines are also necessary, which might also be supplied from the United States. There might also be an opening for American pumps to supply water for

the plantation bungalows and coolie lines; and for American corrugated galvanized iron for roofing material for bungalows, coolie "lines," and tea factories. This material is all imported from England, and there is much complaint that, on account of the wet-weather conditions, it must be too frequently renewed; and a good red paint which will preserve the roofing better than is now done is also desired.

Superintendents of estates are usually allowed considerable latitude in making purchases for improvements on estates, and equipment such as they recommend, even if costly, is usually approved by the managers or directors of the plantation companies.

OPPORTUNITY FOR SUPERINTENDENTS.

It is usual for beginners on plantations to serve as assistants at nominal salaries until they become acquainted with the practical details of the work and able to assume responsibility. During this period of apprenticeship they are known as "creepers." Many of the plantation companies employ inspectors to visit the different estates at a fee of \$50 for each estate, who give any necessary advice and make confidential reports as to the management. This tends to stimulate attention to scientific and businesslike management of the estates.

USES OF CARDAMOMS.

While inspecting some of the tea plantations in the interior highland districts of Ceylon, I noticed that nearly every tea planter devoted a small portion of his estate to the cultivation of cardamoms. The common practice is to keep a few native jungle trees or Australian eucalyptus on the plantations to serve as windbreaks and furnish firewood, and in among such trees to plant the cardamoms, which need a certain amount of shade for successful growth. The cardamoms grow in clusters like sheaves of corn 7 to 8 feet apart and 12 to 16 feet in height, with spreading tops. Like tea, they yield best at an elevation of 3,000 to 4,000 feet, and with an average rainfall of 100 to 150 inches per annum. There are altogether about 8,000 acres of cardamoms under cultivation in Ceylon.

PRODUCTION AND COST.

Since 1909, when 824,500 pounds were exported, there has been a gradual falling off of shipments, and during 1912 the exports reached only 440,000 pounds, which was the shortest crop for many years. It is anticipated that the exports for 1913 will not exceed 450,000 pounds. This falling off in yield is due to the abnormal seasons, little or no rain falling during the blossoming periods. Prices, however, to local growers have been quite satisfactory. In Colombo well-bleached cardamoms have lately been bringing about \$0.75 to \$1 per pound, and green dried cardamoms about \$0.66 per pound. As a rule, the cost of cultivation is not over \$0.32 per pound.

Nearly all the cardamoms of commerce are exported from Ceylon, so that their prices vary according to local crop conditions and the foreign demand.

The export value of the Ceylon cardamom crop is usually over \$225,000 per year. The United Kingdom, Germany, the United States, and India are the leading importers of cardamoms in about the

order named. The declared exports to the United States in 1913 from Colombo amounted to \$50,806, as against \$36,573 in 1912.

VARIED USES IN FOREIGN COUNTRIES.

As the use of cardamoms as flavoring spices is not apparently well understood in the United States, I have asked the secretary of the Ceylon Planters' Association to state the main purposes for which this particular product of Ceylon is principally used in the different markets to which it is exported. He mentions that in England and Germany, especially, it has important use in the manufacture of medicines as a stimulant aromatic and to neutralize unpleasant tastes in a variety of medicines. In northern Europe cardamoms are used as a spice for flavoring cakes and in the preparation of liqueurs. In Germany the perfectly dried seeds or capsules are sold by almost every grocer as a spice for curry and for homemade curry powders. They are also ground in little spice mills (like pepper mills) and the powder is used in making certain kinds of bread, in the preparation of sausages, in cookery, and in curing tinned fish. The ground seeds are also used in making tooth powder, as a snuff for headache, and in tablet form for dispelling the odor of tobacco smoke and alcohol. The essential oil of cardamoms is now being used by some of the largest perfumers in France and the United States. This oil retains its qualities for an indefinite period if kept in well-stoppered amber-colored bottles in a cool place protected from the light. It is very volatile, of a pale yellow color, has an aromatic, penetrating odor, and a strong pungent aromatic taste. In India, the well-to-do native classes make large use of cardamoms in cookery, flavoring curries, cakes, and confectionery.

On the Ceylon plantations coolies gather by hand the cardamom seed capsules which, spread on trays, slowly bleach and dry in the sun, and are then clipped, graded, and packed in boxes or bags of 50 to 100 pounds for export shipment. Of late a strong demand has arisen from India for dried green cardamoms, which are more highly flavored than the bleached cardamoms. At present prices cardamom cultivation is quite profitable to Ceylon planters and adds considerably to the general prosperity of tea plantations.

PRODUCTION AND USES OF PAPAIN.

[By Consul Charles K. Moser, Colombo, Ceylon.]

The fruit of the papaya tree has always been a favored breakfast dish with travelers in the Orient, the Pacific isles, and tropical regions generally, as much for its digestive qualities as for its lusciousness. Its most important chemical constituent, papain, has long been known to *materia medica* as a vegetable digestive superior to pepsin.

The digestive and disintegrating properties of papain are remarkable. The milk and even the fresh leaves of the papaya tree will render the toughest beef tender in the space of two hours. Native cooks invariably wrap tough raw beef with the fresh leaves for half an hour, or apply a small quantity of the fresh milk directly to its surface, or put a piece of the green fruit into the raw curry when the beef will not boil soft. If a large quantity of the juice is applied to

the raw beef, it reduces it in little over half an hour to a pulpy mass that appears as if it had undergone partial digestion. Papain is said to be capable of digesting ten to twelve times its weight of egg albumen at the temperature of the human body.

Up to a comparatively few years ago the value of papain was little understood, and it was mostly used in making chewing gums and mucilaginous products. Since then the United States, Germany, and England have imported considerable quantities. According to the Ceylon customs returns, the exports of papain from Ceylon to the United States amounted to only \$811 in 1911, and \$4,243 in 1913. The chief reasons for this seem to be that American importers prefer the inferior qualities from the West Indies; also they desire a white or bleached papain, which the Ceylon native is not always in a position to supply. American importers could, without much difficulty, procure an almost unlimited supply of the best unadulterated Ceylon papain if they were willing to pay a slightly better price for it than for the West Indies product and would accept it in its natural state.

The increasing output of this digestive extract from the *Carica papaya* is shown in the exports from Ceylon, which for the calendar years 1911, 1912, and 1913 are given as follows:

Countries to which exported.	1911		1912		1913	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Belgium.....			76	\$74	376	\$610
Germany.....	2,007	\$3,098	1,708	2,322	2,555	4,121
United Kingdom.....	4,054	6,591	9,083	11,138	12,705	14,308
United States.....	550	811	2,048	2,907	2,912	4,243
Total.....	6,611	11,100	12,920	16,441	18,548	23,382

RUBBER TRADE.

[Consul Charles K. Moser, Colombo.]

India rubber stands second in importance in the export trade of Ceylon, the island producing almost the entire quantity shipped. None of it is consumed on the island, but is exported to foreign countries and to India. The production in 1913 was about 25,368,000 pounds, compared with 14,848,000 pounds in the preceding year.

The following table gives the exports (the Ceylon product) and reexports, in pounds, to the principal countries in 1912 and 1913:

Countries.	1912			1913		
	Exports.	Reexports.	Total.	Exports.	Reexports.	Total.
United Kingdom.....	Pounds. 8,195,768	Pounds. 771,490	Pounds. 8,967,258	Pounds. 14,047,708	Pounds. 1,190,936	Pounds. 15,238,644
British colonies.....	281,166	26,275	307,441	565,402	57,526	622,028
Austria.....	77,648	7,268	84,916	40,865	3,441	44,305
Belgium.....	1,246,841	117,400	1,364,241	3,802,351	322,572	4,124,923
France.....	10,949	978	11,927	30,377	2,581	32,958
Germany.....	245,552	23,060	268,612	397,087	33,762	431,449
Italy.....	7,125	699	7,824	41,128	3,656	44,784
Japan.....	78,908	6,995	80,963	288,039	24,518	312,555
Russia.....	3,754	419	4,173	93,160	7,956	101,116
United States.....	4,702,922	442,776	5,145,688	6,059,320	513,538	6,572,856
All other countries.....	2,042	279	2,321	991	.....	991
Total.....	14,847,735	1,397,639	16,245,364	25,367,028	2,160,482	27,527,510

IMPORTS OF RUBBER.

The total amount of raw rubber imported into Ceylon in 1913 was 2,150,482 pounds, of which 1,875,126 pounds came from the Straits and 275,356 pounds from India. Leaving out of account the possibility of complications from the proposed export duty—complete exemption having been promised in regard to the movement of imported rubber sold on this market and exported duty free—there would appear to be ample ground for encouraging further large consignments of Indian and Straits rubber (particularly the former) for sale on the Colombo market.

CEYLON AND MALAYAN PLANTATIONS CONTRASTED.

The contrast between plantation conditions in Ceylon and elsewhere is very great and brings home in a forcible manner the extraordinary adaptability of Hevea to its surroundings. In Ceylon it is all hill rubber. The slopes are frequently strewn with gneiss boulders of all sizes, and in some instances laterite is plentiful. There is almost invariably a plentiful supply of rock. In Malaya hardly a stone is to be found. Not only that, but from Penang southward, as far as Kuala Lumpur, the great majority of the plantations are on flat, low-lying, alluvial land, which would be undrainable in Ceylon and suitable only for rice cultivation. In Selangor a fair number of the plantations consist of moderately hilly land, but here again is found a preponderance of flat, low-lying properties. Negri Sembilan is generally more hilly, as is Malakka, the latter being plentifully supplied with laterite, and resembling Ceylon more than any other district in Malaya.

It is an undoubted fact that Hevea thrives in a most remarkable manner among the boulders of the hillsides of Ceylon, and this abundant supply of stone is an advantage in another way, just as its absence on steep land in Malaya is a handicap. Without these rocks many of the slopes in Ceylon would be virtually unplantable, because the wash of earth during the heavy rains would be so severe as to carry away the young trees. The large boulders mitigate the wash, and the planter improves upon the natural distribution by terracing the slopes with stone at a minimum of cost.

RUBBER-COLLECTING CARTS AND TOOLS.

My attention was drawn to an interesting advertisement that appeared in a Colombo newspaper of carts being introduced by a manufacturing firm of Norwich, England, for the conveyance of rubber latex on Ceylon rubber estates.

These carts are strongly made in four sizes—30, 40, 60, and 100 gallons—with removable galvanized-iron swinging tanks, fitted with air-tight lids, wrought-iron frame and shafts, and steel wheels, and obviously should be a great convenience on rubber estates for the conveyance of latex collected from the trees. Their design would permit them to be drawn by one or two men, according to size and weight of contents, in the same manner as jinrikishas are drawn.

It might be possible for American manufacturers of steel wheel-barrows, concrete carts, etc., to manufacture especially such carts as

would be suitable for carrying latex, not only in Ceylon but also in the other rubber-producing countries, where they would be useful.

American latex cups have been used in Ceylon, but on account of frequent losses by theft are to a great extent being superseded by

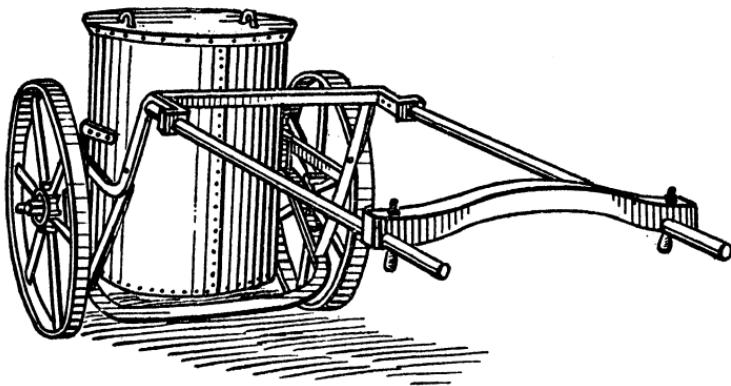


FIG. 24.—Rubber-latex collecting cart, Ceylon.

cheaper coconut shells, which are not worth stealing. Latex-cup supports have been introduced, which may not only lessen the likelihood of cups being taken away by unauthorized persons, but also by keeping the cup up to the level of the tree where tapped, help to

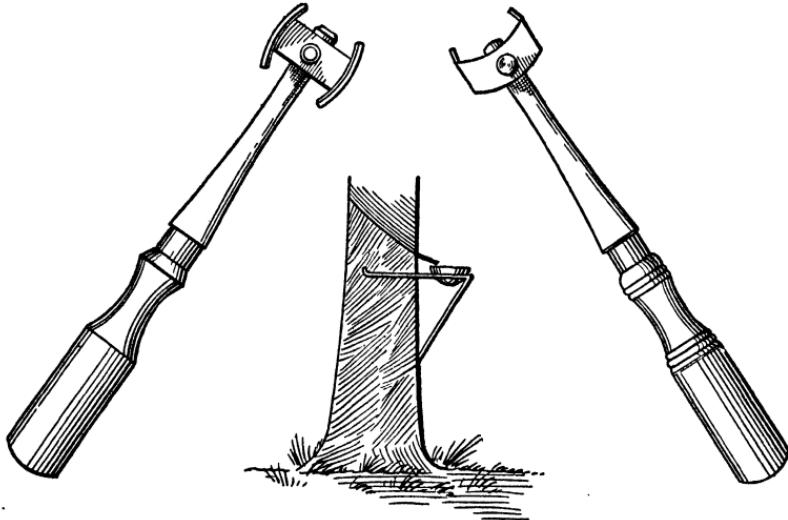


FIG. 25.—Knives for making incisions in rubber trees, and cup, with supports, for gathering latex.

prevent mud or scrap getting into the rubber latex. They can be easily attached without injury to the trees and cost only about \$10 per 1,000.

New patterns of rubber-tapping knives have been introduced into Ceylon rubber estates. They retain the leading features of the older

patterns, but have two-angled cutting edges, giving a clean upward cut and large yield with the greatest economy of bark. They can be both pushed and pulled over the bark. They cost about \$8 per dozen, with blades \$4 per dozen, and are imported from England.

NEW RUBBER COAGULANT.

[By Consul Walter A. Leonard, Colombo.]

An important discovery, it is claimed, has just been made in the use of coconut water as a rubber coagulant. This method, if as successful as experiments would indicate, should prove a great boon to the Ceylon rubber industry. Millions of gallons of coconut water, which now run to waste from copra drying and desiccation mills, can be utilized as a profitable by-product, besides producing a superior coagulant for rubber.

The possibilities of this new process can be realized when it is stated that in 1913 rubber to the value of about \$22,000,000 was exported from Ceylon. Of this amount, \$5,089,167 went to the United States. Rubber ranks a close second to tea as an export article from Ceylon, and takes first place among the shipments from the island to the United States.

DESCRIPTION OF THE PROCESS.

Details of the process are not available, but it is understood that the coconut water is allowed to ferment for four or five days, after which it can be used immediately for coagulating latex. One to two ounces of the fermented liquid will coagulate 1 pint of pure latex. It is said to produce a better rubber than that obtained by the crude acetic acid method, especially so far as color goes, and clearer than that obtained from the cocoa-fermentation acid treatment.

Experiments are being carried on to determine how long the liquid will keep and how practicable it will be to transport it from the coconut plantation to the rubber estates.

COCONUT PRODUCTS.

[By Consul Charles K. Moser, Colombo.]

From long experience it has been established as a rule in Ceylon that 40 full-grown coconuts will produce 1 gallon of oil, and 12½ gallons of oil, or about 500 coconuts, will give 112 pounds of coconut oil. It requires 170 to 200 nuts to make 112 pounds of copra, and 336 nuts are reckoned to every 112 pounds of desiccated coconut. One hundredweight, or 112 pounds, of copra will produce 4 to 5 gallons of oil. There are 750,000 acres planted with coconut in Ceylon.

No machinery is used in Ceylon for drying copra, which is either sun dried or dried over slow fires.

A platform 7 to 8 feet wide of arecanit laths one-fourth inch apart is erected 5 to 6 feet above a pit in which are fired coconut shells fitted into each other in two or more parallel lines 2 or 3 feet apart. This gives a white clean copra due to the fact that dry shells do not emit smoke, while they generate considerable heat. So long as copra thus dried obtains almost top prices in the London and continental markets, estate owners are content with this method as supplementary to the heat of the sun and do not seek more expensive processes. The

lines of shells take five to six hours to burn out. After the second fire the split nuts are turned over on the platform, the third fire releases the kernel from the shell, and three more fires complete the drying. The whole process need not take more than 48 hours, if properly carried out.

MACHINERY USED.

The only machine employed for scraping is a revolving brush with steel bristles, to which the nut is applied in a wet state. This machine has now been largely abandoned in favor of hand scraping with tools shaped after the manner of a joiner's spokeshave. The nuts are wet when the brown rind is being removed, and handwork appears to be more efficient in the operation than any machine yet tried.

Taking the machines in the same order as we have quoted for them perhaps the following information may be of service: No. 4 Brown's patent desiccator consists of a sheet-steel chamber, cased with teak, through which shallow trays, laden with wet grated or shredded nut, are passed. Into this chamber hot air, at a temperature approaching 200° F., is drawn by means of a fan from a specially arranged furnace and made to circulate about the trays. The furnace will consume either firewood or coal, and frequently coconut shells are burned.

The coconut-grating machine consists of a spindle upon which a number of circular saws are placed. Over these saws a grating is fixed, allowing the teeth to protrude slightly. In its turn the grating is covered by a small open cast-iron box, to which a reciprocating motion is imparted. The saws revolve at high speed, and the nuts, being pressed into the aforementioned open cast-iron box, are impinged on the saw teeth; at the same time the reciprocating action of the box compels all the nuts inside to come into contact with the saws.

The sifter is simply a teakwood tray with mesh of suitable sizes to give the correct grades. A crank is attached to one end of the tray to give a reciprocating motion, and the grated coconut discharges at the sides or end.

The shredding machine consists of a rotating disk with four sets of knives fixed to slots. The knives for making shred or strip have serrated edges and are set at a special angle. To make flake, knives with edges similar to a carpenter's chisel are employed, set at an angle somewhat different from that of the knives for strip.

A total of 10½ horsepower is necessary to run all machines, and a suitable motive power is either a crude-oil or steam engine.

COIR FIBER AND YARN.

Coir fiber, from which is manufactured coir yarn, bristles, cloth, etc., is obtained from the husks of the coconut, by native hand processes or by machinery.

Galle is the principal seat of native manufacture and is said to produce a fiber superior to the mill product. The native throws his coconut husks into a bamboo inclosure which he has built in the sea or in a slough close to the shore. After the husks have been softened by the action of the water for about six days they are removed and the fibers are beaten free from the woody pulp with a stone. Then this fiber is hackled with a wooden comb and dried.

COIR MAKING BY MACHINERY.

At the mills the husks are purchased by the bullock-cart load for approximately 8 cents per 100, or sometimes without other cost than cart hire. They are quartered and put in large water tanks and weighted with a network of iron rails. After five days the husks are removed and run through a machine known as a "breaker," composed of two corrugated iron rollers, which crush them and prepare them for the next machine called the "drum." The drums are in pairs, a coarse one for the first treatment and a finer one for the second. They are circular iron wheels 3 feet in diameter, which revolve at high speed, and have rims about 14 inches wide studded with spikes. The husks are held against the revolving drums and the spikes tear out the woody part, leaving the long coarse fibers separate. The torn and broken fiber that falls from the drum spikes is fanned, then dried by being spread in the sun, and subsequently cleaned and baled as mattress fiber. The longer, stronger fibers are washed, cleaned, and dried and then taken to a room where they are further hackled by women, who comb them through long rows of steel spikes affixed to tables. The fibers are now in hanks about a foot long and as thick as a man's forearm. They are bound together, put into a hydraulic press, and baled for shipment as bristle fiber for making brushes, etc.

From the finer mattress fiber is spun what is known as coir yarn, in threads one-fourth of an inch thick and perhaps 50 feet long. It is from these that a very superior rope and several kinds of coarse cloth are made. Coir yarn is manufactured chiefly at Galle, and is mostly shipped from that port, with transshipment at London. On the local market there are two principal grades, the first grade known as Koggala yarn, and the second as Colombo yarn. These two grades are subdivided into 15 to 24 slightly different standards, according to thickness, color, and twist. It is estimated that 1,000 coconut husks will produce 70 to 80 pounds of bristle fiber and about 300 pounds of mattress fiber and yarn.

COMMERCE AND INDUSTRIES.

[By Consul Charles K. Moser, Colombo.]

Conditions in Ceylon were generally prosperous during 1913. Staple products—coconuts, paddy, tea, rubber, cocoa, and cinnamon—were satisfactory both in quantity and in quality. The output of plumbago was less than in 1912, but unparalleled prices were received for the mineral until near the close of the year. The standard of comfort among the native population distinctly rose during 1913, and the villagers began to interest themselves more in better houses and furniture. Their desire for better clothing and food noticeably increased.

Labor was scarce; planters suffered heavy losses from the unreliability of the workers brought from southern India. More serious, however, especially to the permanent population, were the floods which occurred generally throughout the island, but more particularly in the Eastern, Western, and Sabaragamuwa Provinces. January, June, and November, were the principal flood months. The total losses to the Ceylonese population must have amounted to several million dollars, although no precise estimate has been made. In the

Western Province alone—in which Colombo is situated—the loss in crops and property to the villagers by the floods of the Kelani River is estimated at \$250,000. Their buying capacity was considerably affected.

NEW INDUSTRIES.

Almost as serious to the European population and to the wealthier natives was the depression in the rubber market which occurred in September and lasted until the end of the year. Planters and the commercial community generally had heavy investments in young rubber trees, and large returns from the bearing estates were required to develop the immature plantations. The sudden drop in the price of rubber on the London market caused real distress and for a time threatened ruin to a number of rubber companies and even to several Colombo commercial houses. However, the crisis was passed safely and the market recovered somewhat toward the beginning of 1914. Save for this slump in rubber, the heavy rains that impeded cultivation, and the increased difficulty in securing sufficient labor from south India, the planting communities had little to complain of. Rinderpest and foot-and-mouth disease continued to attack cattle, but their ravages were milder than in the preceding year. Rigorous and successful measures have been undertaken by the Ceylon Government to stamp out the diseases.

There were 207 commercial houses registered in Ceylon on June 30, 1912, and 23 new companies were registered to December 31, 1913, bringing the total up to 230. All but three of the new companies were organized to plant or traffic in tea, rubber, and coconuts. Fifty small plots in various parts of Ceylon were planted to cotton during the year, the variety chosen in each instance being Allan's long-staple American upland. A Colombo firm opened a tobacco factory at Teldeniya for manufacturing cigars from Ceylon-grown tobacco. The demand for Ceylon-dried papaya juice, or papain has exceeded the supply. These, however, are minor agricultural industries which are still in the experimental stage.

BUILDINGS, TRAMWAYS, AND TELEPHONES.

Most of the buildings in Colombo are constructed of native brick and cement. There are not more than half a dozen modern reinforced concrete and steel buildings that make any pretension of being fireproof. These fireproof buildings are never more than eight stories high, five being the usual height. As a rule, electric wiring has been carried over the surface of the walls and ceilings, but builders are now beginning to conceal them in iron pipes. No new buildings of any size were completed during 1913, though the two largest buildings in Colombo, a modern hotel and a 6-story office building, were brought nearly to completion. According to the report of the Director of Public Works the construction of small buildings throughout the island was energetically prosecuted during the year, 485 such structures being erected. He notes also that there has been a marked increase in the cost of building materials throughout the island, due to the demand being in excess of the supply. The use of timber from India, the Straits Settlements, and Australia has also considerably increased, owing to the fact that lumber from those places can be more readily obtained than native lumber, is better seasoned,

and cheaper. The Government is making tests with Poilite tiles (a light, rough covering prepared from asbestos); which, if successful in this climate, will lower the present high cost for substantial roofing.

There are only two electrical supply houses in Ceylon. One of these has practically a monopoly, as it furnishes all electrical supplies to the Ceylon Government, which operates the tramways, electric railways of all sorts, the telephone system, the electric-lighting system, and the telegraphs. They do not seem to be interested in American electrical supplies. The other firm is small but active, and was endeavoring to introduce two or three lines of German fixtures before the outbreak of the war.

ISLAND'S FOREIGN TRADE SETS NEW RECORD.

From a report on the Blue Book of Ceylon, prepared by Mr. D. W. Arnott, the second assistant colonial secretary, it appears that Ceylon's trade in 1913, with a total value of \$135,957,043, far exceeded that of any previous year. Imports, excluding specie and the value of coal for the use of steamers, were valued at \$60,368,312, and exports at \$75,588,731, of which \$72,749,722 represents the produce and manufacture of the colony and \$2,839,009 the imports from other countries reexported. The total value of the trade was \$135,957,043. The following table shows the total value of imports and exports (including reexports) for the last five years:

Years.	Imports.	Exports and reexports.	Total.
1909.....	\$40,697,439	\$47,659,140	\$88,356,579
1910.....	48,728,475	54,008,935	102,737,410
1911.....	50,931,520	58,568,763	109,500,289
1912.....	56,880,615	64,547,002	121,428,217
1913.....	60,368,312	75,588,731	135,957,043

British India held first place as a source of Ceylon's imports, but the share of that country fell from 46.92 per cent in 1911 to 40.83 per cent in 1913. The United Kingdom was second with a percentage that increased from 26.84 to 29.19 in the two years. The Straits Settlements ranked third, and Germany fourth, the latter's participation in the import trade of Ceylon increasing from 3.11 to 3.24.

The United States fell from sixth to tenth place. That Republic's percentage of the import trade declined from 1.39 in 1911 to 1.11 in 1912 and rose again to 1.28 in 1913. British India lead by virtue of the enormous supplies of rice and foodstuffs sent to Ceylon for the native population. The position of the Straits Settlements is somewhat fictitious, being due principally to large imports of rubber which are reexported.

PRINCIPAL IMPORTS.

No detailed official statistics of the imports from the various countries are available, but there follows a table of imports compiled from unofficial figures taken from the Ceylon Monthly Customs Returns for December, 1913. They are incomplete and therefore not accurate, and differ considerably from the official totals quoted elsewhere in this report, but they give a reasonably exact idea of the relative trade in the various articles from the different countries. In so

far as corresponding figures for 1912 are available, they are included in the table for comparison; but the absence of values in the 1912 column should not be understood as indicating a complete lack of trade in the items listed.

Articles.	1912, total.	1913				
		Total.	United States.	United Kingdom.	Germany.	British Colonies.
Aluminum ware.....	\$6,630	\$0,599	\$80	\$7,335	\$802	\$1,355
Animals.....	376,563	404,421	.....	6,987	5	394,857
Boots and shoes.....	135,850	125,840	47	123,175	755	1,125
Brassware.....	100,628	131,759	2	50,257	5,588	76,062
Breadstuffs:						
Biscuits.....	202,846	.....	.....	157,774	35,633	9,229
Flour.....	699,525	721,075	72	.....	.....	721,003
Grain.....	16,599,089	17,728,816	7	23,717	.....	17,448,999
Other.....	64,245	.....	.....	22,242	8,044	33,809
Brooms and brushes.....	15,750	75	13,105	1,828	.....	107
Cable and cordage.....	47,665	53	15,360	6	.....	31,916
Cars, carriages, and parts:						
Automobiles, and parts.....	590,209	785,498	89,739	486,327	120,047	23,812
Carriages and carts.....	29,083	31,158	1,915	4,236	131	1,996
Cycles and parts.....	126,503	141,586	1,030	130,838	4,808	3,621
Cement.....	259,532	.....	.....	117,193	102,946	465
Chemicals: Bleaching materials.....	11,500	.....	.....	2,716	6,884	32
Chemists' sundries.....	282,595	280,494	19,845	179,845	19,018	54,285
Clocks and watches:						
Clocks.....	19,436	20,272	12,759	3,552	1,493	232
Watches.....	73,814	86,942	1,150	24,615	2,089	50,520
Coal.....	4,337,818	.....	.....	1,703,764	.....	2,083,630
Copperware.....	25,475	128,379	.....	14,554	101,588	10,644
Curry stufis.....	651,960	746,210	.....	1,464	.....	674,315
Earthen, stone, and china ware:						
Bricks and tiles.....	96,417	.....	.....	20,070	349	73,449
Chinaware.....	153,330	208,570	127	154,471	36,045	1,459
Earthenware.....	79,135	63,396	3	37,329	224	18,012
Electrical materials.....	120,548	77,348	2,727	6,675	4,906	532
Electroplate.....	110,761	86,233	864	80,764	2,742	679
Explosives.....	127,395	96,263	315	42,155	18,015	17,269
Fancy articles.....	240,075	242,930	2,677	100,514	20,587	70,324
Fish:						
Salted.....	1,371,787	724,583	.....	103	2	710,673
Tinned.....	48,542	52,319	9,338	24,448	923	649
Fruit:						
Fresh.....	44,164	51,760	2,311	14,105	966	23,963
Preserved.....	109,672	184,939	7,055	117,761	80	52,742
Glassware.....	185,929	194,693	345	90,142	30,593	1,377
Gramophones.....	.....	17,249	3,757	10,030	1,881	1,004
Haberdashery.....	808,867	784,229	2,368	315,288	61,152	366,133
Hats and bonnets.....	96,213	.....	.....	76,820	.....	17,096
Iron and steel, and manufactures of:						
Barbed wire.....	152,148	21,448	.....	86,523	10,975	.....
Firearms.....	25,107	25,959	2,412	20,887	1,112	52
Hardware.....	827,717	1,125,479	30,559	943,183	86,939	17,903
Galvanized.....	.....	548,912	380	520,205	21,469	612
Machinery.....	353,269	1,228,596	33,200	1,108,092	49,441	18,476
Nails.....	.....	187,131	1,028	139,301	7,201	286
Sewing machines.....	56,800	78,506	1,461	64,248	12,635	13
Steel ware.....	304,611	594,094	1,005	468,517	38,718	778
Tinware.....	119,892	88,169	97	60,338	1,226	26,485
Typewriters.....	22,120	18,089	7,058	10,699	332	.....
Other.....	.....	158,104	.....	56,418	60,022	5,063
Jewelry.....	210,761	216,282	.....	58,757	42,168	112,453
Lamps.....	76,553	89,891	1,720	45,365	33,988	506
Lead, and manufactures of.....	420,485	397,160	3	108,875	1,452	226,830
Leather, dressed.....	.....	35,248	546	9,360	555	22,672
Manures.....	2,458,376	2,513,080	.....	296,889	609,902	1,392,270
Meat and dairy products:						
Meat—						
Bacon.....	.....	41,618	.....	41,331	15	113
Beef, preserved.....	6,732	337	.....	3,168	24	3,109
Frozen.....	119,079	87,102	.....	22,101	.....	64,505
Ham.....	.....	54,429	150	54,092	24	158
Dairy products—						
Butter.....	132,010	.....	.....	871	6	125,967
Cheese.....	28,233	.....	.....	6,492	.....	5,458
Milk, preserved.....	183,129	168,423	177	97,916	2,286	1,568
Mixed goods.....	.....	255,088	.....	142,999	.....	111,370
Musical instruments.....	66,444	48,420	2,599	36,189	2,621	2,615

Articles.	1912, total.	1913				
		Total.	United States.	United Kingdom.	Germany.	British Colonies.
Cil:						
Fuel.....	\$310,187	\$174,325	\$21,259			
Gasoline.....	87,932	152,852	1,622			
Kerosene.....	655,800	673,093	265,777			\$1
Linseed.....	25,208			\$22,311		2,893
Lubricating.....	70,080	83,185	36,732	36,571	\$4,842	3,096
Cil cloth.....	32,201	32,428	3,904	28,257	73	194
Taints and varnishes:						
Painters' colors.....	112,927	106,109	2,030	93,394	4,415	3,489
Varnish.....	19,686	19,625	1,662	16,583	22	101
Paper, and manufactures of:						
Books.....	153,384	172,072	558	96,702	1,000	73,049
Paper.....	139,427	212,291	1,248	141,297	20,611	2,005
Perfumery.....		69,156	658	26,124	28,447	6,861
Photographic materials.....		27,008	3,007	23,660	245	32
Piece goods:						
Bleached.....		1,093,360	1,319	1,061,998	322	25,198
Dyed.....		1,786,116	317	698,841	76,188	675,894
Gray.....		604,278	68,646	280,295		274,763
Other.....		400,975	31	201,718	53,381	57,787
Printers' materials.....		40,207	16	38,720	358	700
Soap.....	220,355	285,651	2,512	152,389	22,540	76,108
Spirits, wines, malt liquors, and other beverages:						
Aerated water.....		15,673		5,351	2,106	7
Beer and ale.....		99,151	1	51,528	44,728	2
Spirituos liquors.....	570,175	604,312	42	275,432	565	15,459
Wines.....	204,010	514,889	802	271,362	8,128	122,848
Stationery.....	114,374	114,097	3,305	94,735	283	857
Sugar, and manufactures of:						
Confectionery.....	151,331	163,750	9	152,834	15	3,537
Sugar.....	1,804,827	1,805,560		13,285	2,910	629,678
Tar.....		6,969		6,904		5
Telephone materials.....		14,062		14,062		
Tobacco, and manufactures of:						
Cigars and cigarettes.....		322,270		289,571	1,712	7,485
Unmanufactured.....	316,401	28,428	4,945	19,756	5	2,650
Turpentine, oil of.....		6,967	1,000	5,907		
Umbrellas.....	176,017	228,299		189,904	2,266	2,212
Wearing apparel, n. e. s.....	513,763	409,088	3,886	220,213	52,832	50,343
Wood, manufactures of:						
Casks and shooks.....	63,841	143,814	41,153	30,052	8,799	62,382
Furniture.....	80,458	48,493	1,650	26,332	1,071	8,447
Woolens.....		107,218		103,732	1,807	97
Yarns.....	75,404	84,738		6,465		67,416
Zinc ware.....	7,468	9,696		2,913	1,799	
All other articles.....	12,482,028	8,373,265	33,263	730,287	123,642	6,064,258
Total.....	56,807,983	56,576,128	764,213	14,112,376	2,038,951	33,362,070

WHAT FRANCE, BELGIUM, JAPAN, AND AUSTRIA SUPPLIED.

France sent motor cars and parts to the value of \$44,003 (unofficial figures); curry stuffs, \$68,264; spirituous liquors, \$145,941; wines, \$67,779; aerated water, \$6,205; butter, \$5,152; chemists' sundries, \$4,761; cigars and cigarettes, \$2,245; fancy articles, \$1,781; tinned fish, \$1,973; preserved fruit, \$3,337; haberdashery, \$5,962; hardware, \$1,241; musical instruments, \$3,466; perfumery, \$4,755; dyed piece goods, \$5,670; other piece goods, \$5,860; sugar, \$1,168; umbrellas, \$8,069; wearing apparel, \$1,917; and other articles that brought the total up to \$477,483.

Belgium's leading export to Ceylon in 1913 was dyed piece goods, which reached a total value, according to unofficial statistics, of \$110,178, followed closely by fertilizers, with a value of \$106,984. Other important items in this trade were: Barbed wire, \$33,202; bleaching materials, \$1,785; motor cars and parts, \$1,149; cement, \$7,101; copper ware, \$1,040; glassware, \$39686; hardware, \$1,346;

galvanized iron, \$6,077; iron nails, etc., \$32,699; machinery, \$5,572; painters' colors, \$1,133; paper, \$5,930; steel ware, \$84,008; sugar, \$27,656; and zinc ware, \$4,792. The total value of Belgium's shipments to Ceylon last year was \$556,357.

Japan supplied \$22,880 worth of rickshaws, \$3,927 worth of chinaware, clocks to the value of \$2,086; coal, \$512,167; fancy articles, \$26,809; furniture, \$2,260; glassware, \$19,424; haberdashery, \$12,365; hardware, \$5,259; lamps, \$2,620; fertilizers, \$2,282; perfumery, \$1,830; dyed piece goods, \$4,601; other piece goods, \$35,868; soap, \$4,003; sugar, \$4,144; umbrellas, \$25,325; wearing apparel, \$73,960; and other articles that made a total of \$1,333,146.

Fertilizers (\$86,080), sugar (\$52,741), hardware (\$36,901), paper (\$13,011), glassware (\$10,792), fancy articles (\$8,796), furniture (\$7,305), soap (\$6,202), cement (\$5,692), and lamps (\$5,423), were the chief articles sent to Ceylon in 1913 by Austria, the total value of whose shipments to this island last year was \$305,361.

FIGURES AS TO AMERICAN WARES MISLEADING.

The figures given in the table are more unreliable with reference to the United States than to any other country, as much American merchandise is sent to Ceylon through British ports, and it is an acknowledged fact that goods made in America are frequently credited to the British ports from which they are shipped. Undoubtedly the actual imports from the United States into Ceylon were considerably larger than indicated by the figures; according to the best information they were from 50 to 80 per cent greater.

Among articles of special interest to the United States barbed wire might be mentioned, the imports of which from the United Kingdom were valued at \$86,523, from Germany \$10,975, from Belgium \$33,202, as against purchases from the United States to the value of \$21,448. In price and quality the United States can successfully compete with all these countries and should monopolize the trade.

LINES OF AMERICAN GOODS THAT ARE FINDING FAVOR.

There is a greater local demand for American-made toilet articles, shaving soaps, face powders, and patent medicines than for those of any other country. The same comments are true for the small but growing trade in fruits and canned fish, a considerable proportion of the quantities credited to the United Kingdom coming from the United States. Fresh fruits shipped hither from the United Kingdom consisted almost wholly of apples grown in the United States and of grapes grown in Spain. Under the heading of preserved fruits is included much of California's canned fruits and vegetables which are transshipped at Liverpool, and far exceed any others in popularity in Ceylon. The trade figures credit the United States with about the same quantity of imports of canned fruits for the past two years.

English-made gramophones were uncommon in the market, yet the United Kingdom is credited with \$10,030 worth, while the United States is given credit for gramophones to the value of \$3,757 and Germany \$1,881. As a matter of fact the Germans sold a large num-

ber of cheap instruments at prices with which the American "talking machines" can not compete, while the rest of the trade was practically all with the United States.

American hardware consisted mostly of small tools, roofing, machinery, and steel mesh for reinforcing concrete. Germany's advantage was almost altogether in its better knowledge of export business and its better organized salesmanship in foreign countries. American hardware on the whole is more popular, and while slightly more expensive is considered superior in quality.

EXPORTS BY ARTICLES AND DESTINATION.

Shipments of coconut products made satisfactory advances in 1913, as did citronella oil and black tea; but cardamoms, cinnamon chips and quills, cocoa, plumbago, and green tea, other important items in Ceylon's export trade, showed a falling off in quantity during the year. The following table gives the amount and the chief countries of destination of the principal exports from Ceylon during the complete calendar years 1912 and 1913 according to the (unofficial) figures of the chamber of commerce:

Articles and countries.	1912	1913	Articles and countries.	1912	1913
Cardamoms.....lbs.	476,011	451,500	Coconuts and products:		
United States.....do.	49,139	52,550	Cofr—		
Germany.....do.	121,154	122,001	Fiber.....cwt..	234,565	257,038
India.....do.	48,221	42,387	United States.....do.	4,453	17,603
Norway and Sweden, lbs.	11,022	11,517	Africa.....do.	31,640	24,616
Turkey.....lbs.	6,331	19,548	Australia.....do.	18,100	16,446
United Kingdom.....do.	210,289	174,751	Belgium.....do.	51,231	54,125
All other.....do.	29,855	28,737	France.....do.	6,622	7,671
Cinnamon:			Germany.....do.	42,531	49,169
Chips.....do.	2,349,944	1,950,438	India.....do.	1,844	2,110
United States.....do.	86,688	42,500	Japan.....do.	6,893	8,219
Australia.....do.	106,994	108,696	Netherlands.....do.	4,373	5,969
Austria.....do.	86,800	39,200	New Zealand.....do.	680	1,531
Belgium.....do.	92,400	137,648	Straits.....do.	1,391	1,053
Canada.....do.	17,024	33,601	United Kingdom,		
France.....do.	108,080	31,675	cwt..	61,427	66,686
Germany.....do.	606,142	428,100	All other.....cwt..	3,380	1,840
Italy.....do.	132,497	157,936	Yarn.....do.	103,862	115,253
Netherlands.....do.	323,904	403,536	United States.....do.	1,318	3,314
Spain.....do.	248,432	118,028	Australia.....do.	5,110	7,018
United Kingdom, lbs.	473,805	387,603	France.....do.	2,682	3,093
All other.....lbs.	67,178	81,855	Germany.....do.	19,887	18,007
Quills.....do.	3,594,930	3,278,993	India.....do.	5,493	408
United States.....do.	697,250	359,795	Netherlands.....do.	1,320	2,829
Australia.....do.	15,350	15,585	New Zealand.....do.	1,293	900
Belgium.....do.	27,500	84,600	United Kingdom,		
France.....do.	24,897	42,379	cwt..	64,394	75,567
Germany.....do.	995,213	1,138,934	All other.....cwt..	2,365	4,117
Italy.....do.	183,715	278,177	Copra.....do.	628,529	1,154,121
Netherlands.....do.	37,978	95,951	Austria.....do.	27,399	42,098
Spain.....do.	724,721	496,233	Belgium.....do.	6,021	33,003
United Kingdom, lbs.	230,764	264,238	Denmark.....do.	78,997	26,167
All other.....lbs.	657,544	502,201	France.....do.	2,000	-----
Cocoa.....cwt.	73,226	69,031	Germany.....do.	366,239	806,288
United States.....do.	5,956	4,384	Netherlands.....do.	1,001	-----
Austria.....do.	1,000	170	Russia.....do.	139,616	241,886
China.....do.	9,395	8,318	Turkey.....do.	-----	4,000
France.....do.	746	1,470	United Kingdom,		
Germany.....do.	5,492	4,102	cwt..	7,256	1,500
New Zealand.....do.	1,646	1,480	All other.....cwt..	-----	179
Straits.....do.	1,893	1,324	Desiccated.....lbs.	31,295,813	34,334,759
United Kingdom.....do.	43,635	44,513	United States.....do.	5,115,720	8,482,346
All other.....do.	3,463	3,292	Africa c.....do.	207,526	219,701

* Includes Newfoundland.

♦ Includes Philippine Islands.

© Includes Madagascar.

Articles and countries.	1912	1913	Articles and countries.	1912	1913
Coconuts and products—Continued.			Plumbago—Continued.		
Desiccated—Continued.			Belgium cwt.	57,474	39,579
Canada ^a cwt.	680,241	836,364	France do	2,403	2,208
Denmark do	40,300	60,450	Germany do	161,138	125,691
France do	376,938	252,590	Japan do	4,407	2,152
Germany do	6,099,362	5,156,840	United Kingdom do	106,964	107,060
Netherlands do	1,034,150	705,703	All other do	3,998	2,123
New Zealand do	336,688	216,972	Poonac do	169,019	239,968
Norway and Sweden lbs.	43,420	96,500	Belgium do	53,224	71,893
Spain do	601,190	532,226	Germany do	113,299	163,783
United Kingdom, lbs.	12,670,710	14,200,206	United Kingdom do	2,496	4,202
All other lbs.	61,712	51,442	Rubber lbs.	15,001,075	28,033,345
Nuts number	15,983,749	16,858,007	United States do	4,833,085	6,417,236
United States do	328,965	297,920	Australia do	250,326	462,473
Australia do	13,600	10,500	Austria do	85,782	31,434
Austria do	341,105	220,700	Belgium do	1,315,298	4,214,736
Belgium do	1,928,112	1,118,120	Canada ^a do	22,078	-----
Denmark do	20,125	47,345	France do	11,568	32,958
Egypt do	1,768,886	1,402,344	Germany do	210,021	417,946
Germany do	2,523,304	1,734,449	Italy do	7,744	44,784
Italy do	91,052	123,855	Japan do	81,456	312,868
Netherlands do	877,140	550,705	Russia do	4,173	101,116
Spain do	44,280	45,310	Straits do	153,795	-----
Straits do	13,989	1,100	United Kingdom do	8,176,523	15,841,126
United Kingdom, number	8,014,426	11,294,146	All other do	3,021	2,873
All other number	9,785	11,513	Tea:		
Oil cwt.	395,740	545,750	Black do	183,092,079	187,018,132
United States do	172,808	318,366	United States do	9,006,053	8,315,598
Austria do	17,587	14,511	Africa ^a do	2,241,520	2,729,640
Belgium do	2,806	4,407	Australia do	18,981,636	21,203,088
Germany do	4,707	1,711	Belgium do	300,146	356,056
India do	1,230	2,951	Canada ^a do	7,098,702	5,804,288
Italy do	2,046	2,312	China ^b do	6,733,270	8,506,841
Netherlands do	1,442	3,116	Egypt do	627,354	623,846
Norway and Sweden, cwt.	31,811	44,542	France do	846,687	756,001
United Kingdom, cwt.	160,383	152,341	Germany do	676,607	631,707
All other cwt.	920	1,493	India do	2,002,831	1,575,916
Oil, citronella lbs.	1,420,306	1,602,481	Malta do	234,360	116,662
United States do	493,333	504,705	Mauritius do	100,911	102,357
Australia do	64,873	58,709	New Zealand do	4,967,657	5,299,810
China ^b do	7,941	15,134	Norway and Sweden, lbs.	171,654	155,433
France do	35,068	59,463	Russia lbs.	14,495,856	18,154,670
Germany do	167,389	296,121	Straits do	546,755	505,071
India do	4,555	10,047	Turkey do	291,832	228,181
Japan do	12,913	13,238	United Kingdom, lbs.	113,385,510	111,414,246
New Zealand do	1,582	1,147	All other lbs.	322,238	363,686
United Kingdom do	632,652	643,485	Green do	7,937,308	5,158,028
All other do	-----	432	United States do	1,476,677	516,282
Plumbago cwt.	651,261	575,944	Canada ^a do	1,982,450	2,188,546
United States do	309,196	292,524	Russia do	2,854,346	1,675,206
Australia do	5,681	4,607	United Kingdom, lbs.	1,583,789	706,561
			All other lbs.	40,046	71,433

^a Includes Newfoundland.^b Includes Philippine Islands.^c Includes Madagascar.

Ceylon's best customer was the United Kingdom, which took 48.61 per cent of the colony's exports in 1911 and 49.45 per cent in 1912, but dropped to 45.54 per cent in 1913. The United States ranked second, absorbing 13.89 per cent of the island's exports in 1911 and 16.63 per cent in 1913. Germany was third, the share of that Empire advancing from 7.08 per cent in 1912 to 10.11 per cent in 1913. Exports to Belgium, in fifth place, increased by nearly 40 per cent, while the export trade with Russia, in fourth place, declined.

EXPORTS FROM CEYLON—EFFECT OF THE WAR.

According to the chamber of commerce figures, exports from Ceylon of both black and green tea for 1914 totaled 195,216,419 pounds, an increase of 3,040,259 pounds over the figures for the previous

year. Even during the five months following the outbreak of the war the exports exceeded those of the corresponding period in 1913 by 1,751,945 pounds. Shipments to the United Kingdom show the substantial increase of 5,000,000 pounds. Shipments to America and Australia exceeded those of the previous year by approximately 2,750,000 and 2,000,000 pounds, respectively. Direct shipments to Russia show a falling off of practically 5,000,000 pounds, and to this may be added the 2,500,000 pounds representing the shortage in shipments to China, the bulk of which find their way to Russia. As a result of the war, supplies of tea to the European Continent have been on a reduced scale and are less by nearly half a million pounds.

The total exports of rubber for 1914 were 39,115,380 pounds, from which, in order to arrive at the quantity of Ceylon-grown rubber exported, 3,797,111 pounds must be deducted, representing the aggregate imports from the Straits, India, and Burma. The result shows an increase in the shipments of the Ceylon product of 9,884,718 pounds as compared with 1913.

Exports of copra for 1914 exceeded those for the previous year by over 15,000 tons. Shipments of coconut oil show a decrease of some 1,600 tons. Exports of desiccated coconut show an increase of 861,406 pounds over those for 1913, and the increase would doubtless have been much larger but for the outbreak of war.

The following table shows, briefly, the total exports of the principal articles shipped from Ceylon during 1913 and 1914:

Articles.	1913	1914	Articles.	1913	1914
Cardamoms.....pounds..	451,500	404,070	Coconut poonac, hundred-weight.....	239,968	229,094
Cinnamon:			Copra...hundredweight.....	1,154,121	1,466,212
Chips.....do.....	1,950,438	1,570,848	Coir, fiber, bristle...do.....	83,083	82,892
Quills.....do.....	3,278,093	2,417,904	Coir-fiber mattress...do.....	173,955	144,112
Citronella oil.....do.....	1,602,481	1,453,520	Coir yarn.....do.....	115,263	97,938
Cocoa...hundredweight.....	69,031	57,786	Plumbago.....do.....	575,944	286,021
Coconuts.....number.....	16,888,007	11,245,619	Rubber.....pounds..	25,433,551	35,318,269
Coconut, desiccated, pounds.....	34,334,750	35,196,165	Tea:		
Coconut oil, hundred- weight.....	545,750	513,698	Black.....do.....	187,018,132	190,734,911
			Green.....do.....	5,158,028	4,481,508

COMMENTS ON AMERICAN TRADE.

An outstanding feature in the import trade of Ceylon with the United States for 1913 was the increased sale of low-priced American motor cars. The American low-priced car was properly introduced into Ceylon, and the result is that it has overcome all competition from other cars of its class; there are 10 different makes being sold now, and each of them seems to be meeting with some measure of success. With one or two exceptions, they have been introduced by traveling representatives, who found that the business which could be done well repaid the time spent at Colombo.

Recently the consulate has made a practice of requesting travelers for American business houses to write out for its information their general opinion of the Ceylon market from their own experience of it. Below are quoted the opinions expressed by the last two commercial travelers who visited this consulate, both of whom had been unusually successful in their efforts to place American goods here:

No. 1.—After having visited the principal centers of India, Ceylon impresses me with the surprising size of its market in proportion to the apparent buying capacity of

its inhabitants, and it struck me as providing an excellent outlet for many American manufactured products which are yet unknown in this territory. I have been agreeably surprised at the reception I have received at the hands of the commercial men, in Colombo especially. They appear not only willing but eager to handle American goods if they can get the manufacturer to make a few minor changes in the various articles for which there is a call. This is a point which, I am sorry to admit, the American manufacturer generally is very apt to disregard. In most cases these specifications are inexpensive alterations, but they mean the success or failure of a product in this market.

CATALOGUES INEFFECTIVE—AMERICAN MANUFACTURERS WINNING RESPECT.

The trade in Colombo, as in most other places in the East, does not care to purchase from catalogues. The local buyers wish to talk personally with the representative of a product they are being urged to buy. Therefore, I consider it imperative to the successful marketing of any American product in Ceylon for a representative of the manufacturer personally to canvass and become acquainted with the trade. If the sale of a manufactured product does not warrant such an expense—a condition often true—then the next best policy is to place the product in the hands of an exporting house whose representatives are directed to call personally upon and canvass the trade. In most instances these representatives are given a gratifying reception.

Ceylon as a market for American motor cars was of little value until two years ago, but within this period important and pleasing developments have taken place. As a matter of fact, over 75 per cent of the sales of motor cars below \$2,750 in Colombo in the last six or eight months have been American cars. I anticipate that within two years this market will be dominated by the sort of cars and trucks that are at present being successfully introduced, i. e., medium and low-priced cars. As far as high-priced American cars are concerned, there is no demand and not likely to be for many years.

No. 2.—This is not a large market, but I am well satisfied with the business I have done here. I was able to get some new business of considerable importance when compared with the present market (which I think will increase in the future). This new business was particularly gratifying because it was from a firm which, a few years ago, made an effort to discontinue and to discourage as far as possible the importation and purchase of American-made machinery and tools—largely on account of disappointments resulting from delayed deliveries and poor packing. The new orders, however, were given because, according to this importer, American packing and deliveries have greatly improved. He also finds he can do better, especially in tools and small machinery, with American manufactures than with any other as to both price and quality. Now that American manufacturers are actually going out after export trade on the merits of American manufactured goods, there seems to be a willingness on the part of foreign buyers to take more interest in the lines we are trying to sell them. I find each year that I am received better, even by new people, than in former years. I find that American manufacturers are treated with more consideration and respect.

POINTS TO BE OBSERVED AS TO WOOD MANUFACTURES.

Several American firms having lately made efforts to introduce pianos and furniture, the following points with reference to pianos particularly, but which hold good for all manufactures of wood, were supplied to the consulate by a local firm:

We send you the following particulars for your guidance, as this is an extremely damp climate:

All centers in the action should be made as free as possible, even to a fault, as they will tighten up here.

Hammer felts should be securely riveted.

Damper felts, check felts, and butt leathers should be securely tied.

All-over iron frame, pinholes bushed. A solid plank is better for this climate than a ply plank.

It is most important that the instruments should be vermin proof. See that this is done near the pedals, and that no opening is left at the top of the bottom door.

All screws used on outside of case should be brass.

All moldings should be screwed; nothing should be glued only.

Sides of case should be well screwed to back bracings.

Belly bars and bridges must be well screwed, even at the extreme ends. This is most important, as these parts are not get-at-able after the instrument is built, and is a simple matter when building. They are bound to spring if not screwed.

Solid cases must invariably be supplied instead of veneer, as veneered cases are useless in this climate.

SHIPPING STATISTICS.

Below is a statement showing the total number and tonnage of vessels of each nation which entered at ports of the island during 1913, exclusive of vessels which called for coal only:

Nationality.	Number.	Tons.	Nationality.	Number.	Tons.
British (United Kingdom).....	1,660	5,075,607	Italian.....	17	48,003
Colonial (sailing vessels).....	992	93,657	Norwegian.....	23	36,084
Maldivian.....	123	13,301	Siamese.....	5	8,132
Austrian.....	110	326,428	Russian.....	62	168,088
Danish.....	16	38,328	Spanish.....	26	64,819
Dutch.....	104	330,268	Swedish.....	1	3,267
French.....	131	461,530	Total.....	3,621	8,098,021
German.....	251	1,013,884			
Japanese.....	100	416,620			

DECLARED EXPORTS TO UNITED STATES.

The declared value of the articles invoiced at the consulate at Colombo for shipment to the United States and its insular possessions during the calendar years 1913 and 1914 is shown in the following statement:

Articles.	1913	1914	Articles.	1913	1914
TO UNITED STATES.			TO PHILIPPINES.		
Cardamoms.....	\$48,844	\$47,421	Cocoa.....	\$151,816	\$120,062
Cinnamon.....	81,885	115,992	Tea.....	11,773	13,127
Citronella oil.....	168,530	193,746	All other articles.....	2,090	3,329
Coco.....	74,898	82,494	Total.....		
Copra.....	675,738	649,085		165,679	136,518
Coconut oil.....	3,333,447	2,207,688	TO HAWAII.		
Coir yarn.....	42,310	35,790	Tea.....	3,622	5,077
Crude drugs.....	27,818	20,035	All other articles.....	436	
Fiber, mattress (coir).....	20,560	10,611	Total.....		
Papain.....	8,118	26,445		4,058	5,077
Plumbago.....	1,622,917	876,304			
Precious stones.....	25,538	15,044			
Rubber.....	5,089,167	4,752,219			
Tea.....	1,474,923	1,921,546			
Tea fluff.....	36,377	20,365			
Total.....	12,780,737	10,984,472			

METHOD OF BUYING GOVERNMENT SUPPLIES.

With the exception of certain articles which are procured locally, the wants of the Ceylon Government, in the way of stores, tools, stationery, hospital equipment, iron and steel, medicines, furniture, fittings, etc., are supplied through the Crown agents for the Colonies in London upon requisitions by the Colonial storekeeper, by whom they are issued to the indenting departments. The Colonial store-keeper, whose headquarters are at Colombo, has the general supervi-sion and direction of Government stores and magazines; the supply of building materials, stores, and tools for all civil works; stationery, etc., for all civil departments; clothing and equipment for all civil

hospitals; the supply of clothing for the police, road pioneers, the Postal-Telegraph Department, and the governor's escort; recovery and credit of value of all civil supplies; transport for civil purposes; and charge of the public furniture of the governor's and colonial secretary's residences.

ANNUAL ESTIMATES—HANDLING REQUISITIONS.

All Government departments except the railway are required to obtain their stores through the Government stores. With this object in view a stock of such articles as are in constant demand by the various departments is always kept. Each department is required to send to the Colonial storekeeper annually, on or before January 15, an indent or estimate of its probable requirements for the following year. These estimates or requirements are embodied by each section of the stores in one or more indents, which are forwarded from time to time through the Colonial secretary to the Crown agents at London for execution.

As stores are required by departments, requisitions prepared in duplicate are sent to the Colonial storekeeper. The articles are then either issued from stock or are ordered from contractors, but if no contract exists for their supply, they are obtained at the discretion of the Colonial storekeeper from local dealers on orders signed by him or his assistant. When the articles named in the requisition have all been issued, the requisition is closed and the prices of the articles are entered in it. The original copy is then forwarded to the indenting department for settlement through the treasury, and the duplicate copy filed in the Colonial storekeeper's office for reference and for audit.

SOURCES OF SUPPLY.

All stores required for the Ceylon Government are obtained either from England, India, or local contractors. Those needed for general use and included in the annual indents furnished by departments, are obtained from England and are kept in stock. Stores or material required by any department for a special purpose and which are not included in the annual estimate of usual requirements are applied for by special indents whenever necessary. These indents are prepared in quintuplicate and sent to the Colonial storekeeper who, after satisfying himself that there are funds available to meet the cost of the stores indented for, forwards the indents to the Colonial secretary for transmission to the Crown agents. Articles ordered on these special indents are, on arrival, delivered direct to the indenting department without passing through the store books and are treated as articles received in transit. On receipt of the Crown agents' charges, claims are sent to the departments concerned, and their value is credited to the general stores account by a transfer through the treasury and debited against the books of the indenting department. The Crown agents debit the value of these stores to the Ceylon Government.

Articles which it is considered inadvisable to procure in large quantities from England or India, and which can be obtained locally at a reasonable cost, or such as are manufactured in the island are, as a

rule, obtained on contract by tenders, which are called for by advertisements in the Government Gazette and local newspapers. After a tender has been accepted by the Government a contract is entered into for a period of one, two, or three years. A list of articles which are obtained on contracts is published annually in the Government Gazette for the information of departments.

WARRANTS AND VOUCHERS—RAILWAY SUPPLIES.

At the beginning of each year the Colonial storekeeper applies to the Colonial secretary for an imprest of an amount which he considers will be sufficient to meet the payment for stores purchased locally during the year. An imprest warrant is then issued for such amount as the governor may sanction. Each contractor or other supplier of goods forwards, as soon as the articles ordered have been supplied, a claim voucher to which is attached the order issued to him, duly receipted by the indenting officer. The claim vouchers are checked, and if found correct, certified, dated, and headed "General stores account." They are then indorsed with a request to the treasurer to pay, the amount to be paid being expressed in both words and figures. The vouchers are then handed to the payees with instructions to present them at the treasury for payment. The amounts so paid by the treasurer on account of stores locally purchased are in due course debited by him to the general stores account.

While the Government railways are not required, as other departments, to obtain their stores from the Government stores, yet they can do so as occasion requires, or buy at once locally out of their own funds. In general they obtain most of their supplies, such as need importation, through the Crown agents of the colonies in London. The railways are under the control of a general manager. As a rule the Crown agents at London, acting on general specifications furnished them, will purchase such particular makes as in their judgment seems best and in accordance with their general purchasing policy, except in cases where certain particular makes may be especially desired and requested by local departments with the sanction of the Colonial storekeeper. The address of the Crown agents of the Colonies is Whitehall Gardens, London, SW., England.

MARKET FOR AMERICAN MERCHANTISE.

Reference has been made to certain kinds of American machinery and hardware used in Ceylon and to the possibility of more extended use of such goods, also to the increasing trade in American motor cars and in American kerosene oil. At present I would like to make certain observations concerning a variety of other articles of American merchandise noticed in Ceylon, such as seemed to have a fair importance in the aggregate and to possess interest as demonstrating that there is a market here, though in some instances perhaps a very small one, for American goods suited to the habits and conditions of tropical life.

I may first make a reference to the fact that American sewing machines were noticed in frequent and constant use in every native district visited. Practically all the sewing and tailoring in this island, a large part of whose people are engaged in various industries

requiring the use of the needle, is done on American sewing machines, introduced here by persistent and systematic work of direct agencies. It was most interesting to watch in front of open bazaars, in even the most remote villages, American sewing machines hard at work sewing up simple cotton garments for the native population whose chief tangible assets are the very humble clothes they possess. It is likely that these sewing machines have made the United States really famous to many of the uneducated Ceylonese who may otherwise have never heard of this country, except perhaps from noticing "U. S. A." on empty kerosene cases, which they find useful for many purposes.

TYPEWRITERS, PENS, AND TIMEPIECES.

Similarly American typewriters furnished an interesting object of observation when visiting business offices, and the headquarters of big tea and rubber estates, where the managements are almost invariably progressive and up to date, keeping as they do elaborate books, showing wages paid, cost of operation, etc., and typewriting numerous accounts, reports, and business letters. American fountain pens also seemed much used.

American clocks to a very important extent were noticed keeping the time of Ceylon, and noted for reliability and general appropriateness in the homes of the people. The Ansonia and Seth Thomas seemed particularly much used. A few American watches are also sold here. There is a great deal of newspaper advertising of watches in Ceylon, chiefly of those selling from about \$1.70 up to \$30 and of Swiss, German, and British manufacture. It is much the fashion in Ceylon, both with men and women, to wear wrist and bracelet watches.

LAMP WARE AND ILLUMINATION.

Another line in which imports from the United States were observed in frequent use is lamps, especially those of the storm-proof type. There is, however, evidently room for a much larger sale of American lamp ware, if due attention were given to the low prices and special styles desired, and the local business better advertised and otherwise pushed. Except in Colombo and Kandy, and some other localities where electric light is available, including many tea plantations where water power is developed for factory purposes and incidentally for electric lighting, Ceylon depends for illumination chiefly on oil lamps and candles. Even in the two cities mentioned, where electric light is available, the native residents seem to prefer lamps to the expense of electric installation.

There is an important market, therefore, for reliable household lamps, including hand or wall lamps which sell for about 75 cents apiece, hanging kitchen lamps which sell from about \$1.32 to \$1.85 apiece, with enameled tin shades and brass containers, hanging lamps of silver, copper, bronzed or gold gilt, with brass containers, selling from about \$4 upwards, nickel-plated body lamps selling for about \$1.20 upwards, and glow lamps selling for about 30 cents apiece. In some localities electric lamps have a sale. There are many other styles of lamps in use, but those mentioned will afford some indication of the nature of the trade.

MUSICAL INSTRUMENT TRADE.

American pianos are to an important extent used for amusement and entertainment purposes in Ceylon. One important firm has an agency for a piano manufactured at Chicago, of which it sells a fair number. Pianos can be obtained in Ceylon on the purchase-hire system, and old pianos are frequently taken over in part payment for new ones. As competition is very keen in the Ceylon piano market, both manufacturers and local dealers have to be content with rather small profits. Prices for pianos generally range from \$260 to about \$600. Autopianos are much liked here and have a good sale among those who can afford them. One American autopiano sells for about \$730 net cash, or by 24 monthly payments of about \$33. In the local advertisements of this autopiano, it is called the "dreadnought of piano players," and it is mentioned that 45 of them are installed on ships of the United States Navy, which proves their capacity for standing damp atmosphere, hard work, and constant movement. Piano stools locally sold are mostly English made and sell between \$6 and \$13 apiece. Nearly all music sheets are imported from England. There would seem to be a chance for the introduction of more stirring American melodies, marches, dances, and ragtime tunes.

There is also a wide popular use of seraphines for Indian music, selling for from \$20 to \$25 with hand bellows and \$50 to \$85 with foot bellows. American organs are sold here, although the trade is naturally limited. Phonographs also meet a popular demand. There is also a good sale in Ceylon for cheaper musical instruments, especially accordions costing from about \$1.60 to about \$18.50. I am told that there are about half a dozen important public bands in Ceylon. I inquired of the leader of one of these bands, which plays on a public square in Colombo, from which country it obtained its drums and other instruments. He stated that they came from Germany, and that while they had information concerning similar American articles deemed the prices too high.

MEDICAL SUPPLIES.

The different chemists' shops in Ceylon and general department stores where household remedies and toilet articles are sold afford some of the most promising indications of American trade that are to be found anywhere in the island. With regard to certain American medical preparations there is a good business without much or any public advertising, the manufacturers evidently acting on the theory that the real way to reach the patient suffering from any complaint is through the family doctor, who may prescribe American preparations if convinced of their merit. There is, however, a field in Ceylon for larger use of American proprietary medicines with tonic properties, especially for upbuilding the system after attacks of malaria. English medicines of this class are very widely advertised here. A great many people in Ceylon, in case of complaints of which they understand the nature and the general remedy, are inclined to act as their own doctors, and a great many tea, rubber, and coconut estates have well-equipped dispensaries of their own, the local managers serving out the remedies to their laboring staffs as their own

knowledge of the particular case in question may seem to require. Special medicine cases, including preparations chiefly in tabloid form, are frequently sold for use on remote estates. Such medical outfits include especially such articles as quinine bisulphate in 3 or 5 grain tabloids, ammoniated quinine, calomel, bismuth and soda, phenacetin, soda mint, potassium chlorate, rhubarb, zinc sulphate, boric acid, potassium permanganate frequently used with hypodermic syringe for snake bites, also court-plaster, compressed lint, lancets, scissors, forceps, and catheters.

As an indication of the wide necessity in Ceylon for the use of medical and tonic preparations for keeping up the health of the people, and as suggesting the sort of remedies American manufacturers might put up with advantage for the Ceylon market, I might mention that the recent sanitary commission appointed to devise means to check the spread of preventable diseases showed in their report that from July 1, 1911, to June 30, 1912, there were 869,369 cases of malaria in the island (nearly one-quarter of the total population) treated in hospitals and dispensaries, to say nothing of the large number of cases known to be treated in private homes and on private estates. There were also 5,811 cases of diarrhea so treated, 5,178 cases of ankylostomiasis, 4,576 cases of dysentery, 3,351 cases of parangi, 1,158 cases of phthisis, 1,929 cases of chicken pox, 614 cases of enteric or typhoid fever, 443 cases of intestinal parasites, 304 cases of smallpox, 71 cases of filariasis, 51 cases of cholera, 66 cases of tetanus, 23 cases of puerperal fever, and 7 cases of plague.

TOILET REQUISITES.

In such toilet articles as safety razors, shaving soap, tooth paste, and borated talcum powders, etc., American manufacturers have a most decided lead in the Ceylon market. Several general American toilet soaps and one medicated soap have important sales here, although most of the soaps in use are of English manufacture. A most convenient kind of rubber sponge made in Chicago is also meeting with good sale. There is an unusually extensive demand for toilet powders and medicated soaps for giving relief from the effects of prickly heat and other skin troubles incident to the tropical climate.

AMERICAN TEXTILES AND APPAREL.

As regards apparel, certain kinds of American piece goods, boots and shoes, silk hosiery, and corsets are finding a fairly favorable market in Ceylon, considering the limited proportion of really well-to-do people in the island and the very low purchasing power of the great masses of the native population. Gray cotton piece goods next to kerosene oil furnish the largest item of import into Ceylon from the United States. There are also lesser imports of dyed cotton piece goods from the United States. The ranges of material for wear in Ceylon vary considerably according to season and to height above sea level. At elevations of from 2,000 to 5,000 feet, where many of the most prosperous planters live, the climate is much cooler than in the low lands of the sea coast. Generally speaking, materials for clothing include, besides the very cheapest cotton cloths, bleached and unbleached drills, white and colored ducks, crash cloths, khaki

drills and checks, China, Assam, and other silks, alpacas, white and colored flannels and tweeds, and broadcloth for dress suits. As already mentioned in my remarks concerning sewing machines, tailoring is an important occupation in Ceylon, and besides taking care of all local requirements, considerable attention is paid to the transient tourist trade. To every one of the large steamers calling at Colombo on their voyages between Europe and the Far East, local tailoring firms send representatives to take orders from passengers, and any number of cheap suits suitable for wear in the Tropics can be made within the few hours of such ships remaining in the port.

Several new specialties of American apparel have lately been introduced into Ceylon. One is porous knitted underwear, very soft and cool, and selling for about 75 cents apiece for vest or short drawers, and the other is silk hosiery for ladies and gentlemen. The manager of the firm which introduced this latter line from the United States told me that on a recent visit to that country he noticed the frequent use of silk hosiery and the cheap prices at which it could be bought, and so he resolved to experiment with this line in Ceylon.

In boots and shoes the demand in Ceylon is limited almost entirely to the European population and to a few wealthy natives and those in official service. Among these American boots and shoes are very popular. The native classes of Ceylon go barefoot. Among the European women in the island American corsets are in considerable demand, and for the same reason as American boots and shoes, mainly because the shapes fit well. The average woman in Ceylon does not wear the same corset very long, but makes frequent purchases, and so usually desires inexpensive makes.

ARTICLES FOR THE HOME.

In regard to household equipment in Ceylon, in addition to lamps already mentioned, there is a certain amount of business done with the more well-to-do people in American refrigerators, ice-cream freezers, padlocks for doors and boxes, electroplated ware, cut-glass ware (known in Ceylon and India as crystal ware) oilcloths, moldings and picture frames (these are usually stained or colored locally and gilded styles are not in demand), also electric fans, for which there is now a rapidly increasing use. Cooking utensils are nearly all of British manufacture. Climatic conditions require houses to be coolly constructed and to afford as few places of cover as possible for insects. Carpets are very little used on the floors, as they are really unsanitary owing to the difficulty of keeping them clean and free from insects. Oilcloth, linoleum, or rubberoid floor coverings have more utility, so that there is a good field for their importation. For house roofs red tiles are most used, but in country districts, and especially for factories and coolie "lines" (abode of native laborers), corrugated iron is being used more and more. Most of the house furniture is locally made, except metal bedsteads, which come almost entirely from England. These are all equipped with framework for mosquito netting. I wrote to one leading house-furnishing establishment in Colombo to inquire if American metal bedsteads could not be introduced. This firm replied as follows:

Regarding bedsteads, we do not stock any American goods, as we are well catered for in the English markets, where the manufacturers have given special attention to

the designs required for the Ceylon market. We buy all our bedsteads from the largest bedstead manufacturers in the world, who have a very extensive range of all styles and finishes. We candidly do not think there is much scope for American trade in this connection.

For American camp furniture, including camp stools, chairs, and beds, easily collapsible and portable, there is a wide use in Ceylon, and it is one of the most popular American selling lines in the island. Also American patent vacuum flasks meet with a good sale, especially from travelers, motorists, sportsmen, etc.

FOODSTUFFS—THREE CLASSES OF SHOPS.

In the sale of food supplies in Ceylon, American trade is confined mostly to a few canned specialties, such as canned salmon, asparagus, peaches, pears, and apricots from the Pacific Coast States. Australia supplies Ceylon with a greater part of its provisions not locally produced, such as meat, flour, sugar, jams, lard, butter, cheese, apples, wines, and horse food. The frequent steamship service between Ceylon and Australia has caused an enormous interchange of such products as Ceylon tea for Australia, and Australian produce for Ceylon.

There are three main classes of shops in Ceylon: First, native shops catering to the purely native trade, which, with the exception of kerosene oil, cotton piece goods, and cheap lamps, also a few simple hardware articles, can hardly be of much use in connection with the sale of American merchandise; second, native shops catering mainly to the tourist traffic, and especially dealing in such articles as Ceylon jewelry, pearls, and precious stones, laces, embroideries, ivory work, Japanese and Chinese mandarin coats and kimonos; and third, European establishments which deal in a variety of goods used by the European and more well-to-do native classes.

It is to this third class of firms that American manufacturers must mainly look for the introduction and sale of the most numerous classes of merchandise possible of export to Ceylon. These European houses are, in some instances purely local, sometimes operated in connection with similar establishments in Bombay, Calcutta, and Madras, and some of them are really controlled in London. The business possible of development through them may be handled by visits of commercial travelers, in some instances by sending catalogues, samples, etc., and frequently by seeking trade through London. The purchase of Government supplies, which is in itself a very big item in the trade of the colony, is mostly conducted through the Crown agent of the colonies in London.

OPINIONS OF BUSINESS MEN—TRAVELERS' REQUISITES.

In corroboration of the suggestion that American manufacturers might advantageously do business in Ceylon as well as in other parts of the Far East, through the medium of London, I may quote from letters received from two of the leading department stores of Colombo, to whom I wrote, asking if they would not be prepared to increase their imports of American lines in which there seemed promise for expansion. One of these firms wrote me: "In some cases, like American clocks, which have a good sale in Ceylon, we do business with the manufacturers direct, but as a rule we find we can

procure American goods better through London than direct from America." The other firm wrote: "We receive a good many lines of American manufacture, but these are mostly bought in London by our head office and distributed to our various branches. In some instances direct shipments from the United States also take place. Among the several lines imported by us to advantage we might mention toilet soaps, perfumes, men's shaving specialties, boots and shoes, hosiery, underwear, domestic hardware, camping furniture, and men's small wear."

The most active period for trade in Ceylon is during the tourist season in the winter time, when the island is not only visited by most tourists, but also when its wealthiest class is most generally at home. There is a specially large business in travelers' requisites and in photographic material for use of transient visitors who like to take photographs of the novel sights they see. As an important port of call for steamers between Europe and the Far East, a good deal of business is done at Colombo in supplying goods both to the steamers and to passengers.

JEWELRY MANUFACTURE—GOODS FOR THE MONSOON.

One of the most interesting native trades in Ceylon is that connected with the manufacture of jewelry. The natives themselves are inclined to put all their surplus earnings into jewelry instead of into the savings banks or in business. Moreover, there is a large sale of jewelry to travelers and tourists who like to take away with them, as souvenirs of Ceylon, many of the beautiful pieces made up of moonstones, sapphires, and pearls, for which the island is famous. There is evidently scope for the introduction of small crucibles, tools, and engraving instruments from the United States to assist in such work. It is interesting in this connection to note that American engraving works, with machines imported from the United States, have been started in Colombo to execute all kinds of engravings, letters, and monograms on jewelry, bloodstones, glassware, embossing seals, peon badges, etc.

There is always a lull in the trade of the island between April and September, except when the southwest monsoon breaks during the middle of May, when there is a special demand for waterproof over-coats, umbrellas, etc. In fact, as regards umbrellas, there is a fairly big demand all the year round, as they are needed not only for protection against the rain, but also against the intense tropical sunlight. The more well-to-do native class, including merchants, etc., are especially inclined to protect their heads from the sunlight with umbrellas, as usually their religious or caste rules prevent their adopting the type of topie or sun hat worn by Europeans. The umbrellas used by the natives are usually black cotton, but quite frequently white.

COLOMBO A DISTRIBUTING MARKET.

It may be mentioned that Colombo is not only the chief distributing center for Ceylon, but also does considerable business with the extreme south of India. It is only one night's steamer run from Tuticorin, at the south end of the Indian peninsula, whereas Tuticorin is 24 hours' journey on the fast mail train from Madras.

There are probably not over 200,000 people in the island who are sufficiently well-to-do to offer a favorable market for most kinds of merchandise. There is, however, a gradual uplift observable in the standard of native living, the country is very prosperous, wages are rising, and proprietors of tea, rubber, and coconut estates are doing exceedingly well.

As an instance of how conditions may be slowly changing in the direction of modern improvements, I may mention that while making a short stop at Colombo about five years ago en route to my former post at Hobart, Tasmania, I was impressed, as most visitors are, with the universal picturesque costume, curious round turquoise combs, and effeminate head dress of the natives, the general use of rickshaws, and the use of native servants to work fans in private residences. On the occasion of my present visit, however, it was noticeable that many of the natives had cut off their long hair and some, especially the younger men, were wearing European clothes; while rickshaws to some extent were being superseded by motor cars, and electric fans had almost entirely superseded those worked by hand power.

In connection with the great neighboring market of India, and also the prospering Malay States and other parts of the Tropical Far East, Ceylon is exceedingly worth cultivating, although it is not so important if considered solely by itself. It must be remembered also that Ceylon has certain local peculiarities and necessities, and that it has its own Government as a Crown colony, and its own tariff system, entirely apart from that of India.

I heard much complaint from merchants in Ceylon as to the extremely long time it takes to secure goods from the United States and to conduct necessary correspondence and that this is one of the chief reasons why they did not deal more largely in American goods. If there were frequent direct steamers calling here from the United States and no necessity for transshipment, there would be much larger trade.

AMERICAN WHEELS FOR RICKSHAWS.

American wire wheels with rubber tires are beginning to compete seriously with Japanese wooden wheels for use on the better class of rickshaws in Ceylon. They are sold at Colombo for about \$50 per pair, equipped with $\frac{1}{2}$ -inch tires, the circumference of the wheel being about 42 inches. As it is obvious that wire wheels on rickshaws are becoming popular, some Japanese firms have been sending wire-wheel samples to Colombo, at cheap prices, but of such inferior quality that dealers in the best rickshaws have not given them any serious consideration. The American wheels arrive neatly packed in boxes, whereas the wooden Japanese wheels, which are merely bound up in straw covering, often arrive with broken spokes. The wire wheels have the advantage over the wooden ones not only in neatness of appearance, but also in creaking less on specially hot days and in creating less unpleasant vibration. For persons in Ceylon who have their own private rickshaws, and especially for ladies who value smartness in appearance, the American wire wheels are rapidly gaining in favor. For the ordinary coolie, however, who draws a rickshaw for hire, the American wire wheels are too expensive, and for this class of trade it is probable that Japanese wooden wheels, rubber tired, and selling for about \$28 per pair, will continue to hold the market.

USE OF RUBBER TIRES ONLY RECENT.

Up to about five years ago there were no rubber-tired rickshaws in Ceylon, but at present nearly all are rubber tired, the rickshaw coolies finding it very difficult to get patronage without them. The tires are imported chiefly from England, being bought wholesale by the thousand feet, most of them being seven-eighths of an inch thick. They retail in Colombo for about \$1.90 per pound, which is twice the wholesale price paid for them by the dealers, who, however, pay the expense of putting them on the wheels, which work is done by machines.

A few years ago a local rickshaw firm imported a large number of American wooden wheels, but while the woodwork was quite satisfactory, the ball bearings, axles, and other metal parts gave considerable trouble and were unworkable within a very short time; on the other hand, Japanese wooden wheels, constructed much more simply, and crude in appearance, have the reputation of running for as long as three years at an average of 30 miles a day without showing serious deterioration. At present all of the wooden wheels used on Ceylon rickshaws are of Japanese manufacture. Their mechanical details can easily be comprehended by the coolies. They have plain straight axles and simple cast-iron bushes, with a nut on one side of the bush and leather washers between. All these parts are easy of readjustment and replacement, and if lost or broken are not expensive to renew. A new axle will not cost over \$2.50 and a new bush not over 36 cents.

Rickshaw bodies used in Ceylon come almost entirely from Japan, very few being made locally. They are well lacquered and nearly always black in color, though sometimes red. Brakes are put on in Colombo; they are intended for mountainous country. Generally speaking, the Japanese rickshaw meets satisfactorily two essentials, namely, that it be cheap in price, and that it is so light and well balanced that it is easy to pull. It is a curious fact that the rickshaw coolie can run faster drawing a rickshaw than he can run alone, the poles being so well balanced in a well-made vehicle that they give him support, enabling him to continue for hours his treadmill-like run.

COST OF ACCESSORIES.

An ordinary Japanese rickshaw with flat iron-rimmed wheels of the cheapest make, with lamps, but without bells, sells in Colombo for about \$33; the prices ascend with increased strength and style and especially when the rickshaws are built for use on up-country mountainous roads, in which case they must be equipped with stronger axles, broader wheel rims, etc. The addition of rubber tires adds about \$18 to the cost. The finest rickshaws in Ceylon, known as the Geisha carriages, cost about \$85 and are much used by ladies. They have handsomely finished bodies, seats, and arm rests, are upholstered in leather, have good hood coverings, waterproof aprons, and detachable side wings, and are well sprung and fitted with American ball-bearing, rubber-tired wire wheels, plated hubs, etc. None of the rickshaws used in Ceylon can seat more than one person.

There are probably about 150 rickshaws sold in Colombo every month, the business being in the hands of about 10 dealers who

cater for the entire trade of Ceylon, as well as taking many orders from South India. On rickshaw bodies their profits are said to be about 12 per cent, on wheels about 20 per cent, and on rubber tires up to 100 per cent. There is also a profitable business in rickshaw accessories, parts, and fittings, including especially mats, lamps, and bells, all of which are supplied from England. All rickshaws in Ceylon are obliged to be equipped with lamps and bells. The lamps are mostly oil burning, selling for about \$1.60 per pair, although a few use carbide and are more expensive. The bells, which cost about \$2 apiece, have loud double chimes and are worked with springs. American bells have been tried, but it is complained that after a certain amount of bad weather they cease to give forth any effective noise.

SHREWDNESS OF COOLIES IN PURCHASING RICKSHAWS.

The rickshaw coolies of Ceylon usually buy their rickshaws from local dealers on an installment plan, paying about \$5 per month, the dealers by legal agreement maintaining a lien on the rickshaw until the debt is entirely paid. Local dealers in rickshaws state that the coolie is a most particular person to deal with and often spends hours in the observation of a particular vehicle before making up his mind to purchase it. Sometimes a faint, almost unnoticeable scratch on the lacquer is sufficient to create an adverse judgment.

When public rickshaws are used in Ceylon, the fare amounts to about 8 cents per mile. Most of the rickshaw coolies are Tamils from South India. They make a fair living, especially when many tourists are in the island, as these ordinarily pay more than the legal rates.

MACHINERY AND HARDWARE.

Ceylon affords an important market for certain special classes of machinery, hardware, and agricultural and mechanical appliances, and the outlook for increasing importations of such articles seems full of promise. American manufacturers of such products have not yet participated in this trade to a very important extent, and the bulk of such business is controlled by firms of the United Kingdom.

There are indications of dissatisfaction with certain kinds of machinery now in use in Ceylon, especially rubber-working apparatus, and it would seem likely that if American manufacturers could show some substantial improvements on existing types, exhibit them at local exhibitions, especially at the "all-Ceylon" exhibition, which promises to become a permanent annual event, and otherwise exploit the same, they might have a good chance of effecting important sales. It also seems likely that certain necessities connected with the industrial development of Ceylon will create in the future a special demand for certain mechanical appliances, such as aerial trams or cableways and suction gas plants, the former being needed to get over the increasing difficulty of transporting goods, owing to the mortality among bullocks used for transport, and the latter becoming desirable in view of the increasing cost of the oil or "liquid fuel" which is now the chief motive power for engines driving tea and rubber machinery.

NO AMERICAN RUBBER MACHINERY.

As regards rubber machinery, different planters and local engineers I have interviewed state that there are serious defects in the rubber washers or roller mills which squeeze out the water in the latex before it is sent to the dryers, and also in the dryers. There are four makes of rubber washers and two of dryers (one made in Colombo) on the Ceylon market, and it has been suggested to me that American machines which would improve on these in economy and efficiency would be much welcomed. I found only one American article widely used in connection with the rapidly developing rubber industry of Ceylon. These are small lead-coated cups for catching the rubber latex as it drips from the trees. However, they are so frequently pilfered by natives that they are going into disuse and their place taken by coconut shells, which are almost as serviceable and are so cheap and plentiful that there is no motive for stealing them. After the latex has been caught in these cups, it is poured into iron enameled buckets about 15 inches high and 14 inches in diameter, which are all manufactured in England.

TEA-PACKING MACHINE—MARKET FOR BOXES.

The tea-manufacturing machinery used in Ceylon appears to occasion no dissatisfaction, no defects being complained of. This machinery is mostly supplied by two leading firms of the United Kingdom. There is, however, a feeling that it costs too much for packing and boxing the tea and for wrapping in lead and aluminum paper. One planter told me that he estimated that this final preparation of his tea for export cost him about two-thirds of a cent (American money) on every pound shipped. It would seem possible that American manufacturers could supply the simple devices required for tea packing, which would not need to differ essentially from machines used for packing rice, seeds, sugar, etc. The best known tea packer in Ceylon is made in two sizes, single and double, the former costing about \$170 and the latter about \$260, with hoppers \$70 extra, f. o. b. Liverpool.

As regards boxes and packages, it would seem also that there might be some chance for American manufacturers to get some of the business, especially perhaps as regards tea intended for export to the United States, where there seems to be a growing demand for good products put up in attractive boxes or packages. By mutual arrangement with American tea importers and Ceylon exporters, it might be possible, by use of suitable American boxes, to increase the sale of Ceylon tea in the United States. According to the Ceylon customs returns, the import of tea boxes from Japan for 1913 showed an increase of 296,697 boxes as compared with the previous year, which was mainly due to the use made of such boxes for rubber as well as for tea.

POPULARITY OF AMERICAN OILSEED MACHINE.

The coconut industry of Ceylon is now making a rapidly increasing use of American oil expellers. These were first used at one particular mill, which was so successful with them that an effort was made to preserve secrecy as to their origin by removing the name plates

of the American firm manufacturing them. The attempted monopoly of this machine, however, was spoiled by investigations made by a leading Colombo hardware and engineering firm, which discovered that the home of this machine was in Cleveland, Ohio. This firm now is acting as an agent for this American oil expeller, has been advertising it extensively, and finds it meets with an eager demand. Of late, however, this firm has been much disappointed on account of the American manufacturers selling their machine through other Ceylon agents as well, and it is now dropping its campaign of advertising and is ceasing to push this machine.

Other kinds of machinery for use in this industry are in part imported from England and in part made locally. Husk-crushing and fiber-extracting machines are made very cheaply by local firms. American machinery for desiccating, etc., is considered too costly without any special advantages being noticeable. American baling processes might possibly, however, be introduced to advantage. A great deal of interest has lately been aroused in some German machinery, recommended by the Imperial Institute of England, for treating coconuts, especially with regard to the separation of the husk, which at present is wrenched out by hand with the aid of a spike stuck in the ground. This machine is quoted at about \$62, and in a recent bulletin of the Ceylon Agricultural Society is described as follows:

It consists of two sets of cone anvil cutters, arranged one above the other, each consisting of three radially placed blades, of which the lower cutter may be adjusted vertically by a lever and can be adjusted to prevent it from turning, whereas the upper one is worked by a handwheel. The coconut is placed, point uppermost between the blades, and then the lower cutter is pressed upward by setting the foot on the counterweights. This causes the blades, which are exactly opposite to one another, to cut into the layer of fiber as far as the hard shell. By causing the upper cutter to revolve by the handwheel, the entire layer of fiber is divided into three long longitudinal segments which can then be easily removed by hand. This process does not present the slightest difficulty with fresh coconuts, so that a skilled workman can remove the fiber from as many as 100 nuts in an hour.

GALVANIZED FENCING WIRE.

In connection with Ceylon's important coconut industry it may also be mentioned that the use of heavy galvanized-iron wire in strands attached to concrete blocks or posts, for fencing off the young trees from the depredations of bulls, buffalos, and wild animals, also barbed wire for the same purpose, is now making it possible to give the coconuts a good start, whereas previously before such wire was used the whole industry was entirely impracticable in many districts otherwise suited for it. One hardware firm in Colombo is now making an important specialty of American barbed wire for this purpose. The daily newspaper advertisement of this firm mentions that "American barbed wire stands superior to all other makes in strength and durability. Galvanized by a special process, it does not rust. Users testify to its great resisting powers and that it would bear the weight of a falling coconut tree."

AERIAL TRAMS AND CABLES.

Regarding the probable greatly increased use in Ceylon in the future of aerial trams and cableways, it would seem that the cables at least might be advantageously imported from the United States,

although it is claimed that the pulleys, gearing, and towers can be made locally. A well-known Colombo engineer (Mr. F. E. Sherriff Mitchell), whom I interviewed on the subject of aerial tramways, said:

Aerial trams or cableways are needed in Ceylon for transporting goods over impassable roads, up steep gradients, and short cuts across ravines to main cart roads. In Ceylon there is now known only the running cableway system, which works fairly satisfactorily, but immediately the gradient becomes, say, 1 in 4, the runner carriers slip, even in dry weather, and during the rains they are practically at a standstill. I believe standing cableways would be advantageous here and not merely for use in connection with the transport of plantation products and supplies, but also in connection with the handling of coal in the loading and unloading of ships' cargoes. A good example of what may be done in Burma this way is the huge standing cableway of the Rangoon Port Trust, the erection of which I superintended. It is capable of handling 1,000 tons of stone in 8 hours. There is no reason why American manufacturers should not have a "look in" at this particular line. I am of opinion that if a smart cableway specialist were to approach the Colombo Harbor Board as regards the handling of coal by cables fixed to the masts of vessels equipped for discharging and bunkering steamers, a profitable concession might be obtained, as the present method is slow and breaks up the coal badly.

At a meeting of the Maskeliya Planters' Association of Ceylon, the chairman, in addressing the planters on the advantages of aerial ropeways or tramways, gave an approximate estimate of the cost of transport by that method, compared with the present method of using bullock carts. His special idea was to connect the two towns of Hatton and Maskeliya by a ropeway and thus save 12 miles of bullock-cart transport. The tonnage of the district considered approximates 11,500 tons per annum, and the present cost of transport is worked out on an average basis giving a present cost per acre of \$1.70. The estimated cost of a ropeway as submitted by a firm in Colombo (Colombo Commercial Co.) was \$40,000, and the cost of the first year's working \$14,666. Adding for unforeseen expenditure \$5,300 it had a total of almost \$60,000, or a cost including capital for the first year's working of \$3.33 per acre, or slightly less than double the present carting rate. Taking an annual cost of working the ropeway at \$15,000, which would include 15 per cent depreciation on capital account, the cost of the second and successive years at 82 cents per acre and over 10 years at \$1.08 per acre including capital cost. Of course this shows considerable saving on present cost of bullock carting.

It seems likely that in the future ropeways will be used in Ceylon in districts where the roads may be particularly bad and roundabout, but where the roads are fairly good and feasible for motor lorries, the latter will probably become the popular mode of transport, especially as they do not require so large initial cost as aerial ropeways.

SUCTION GAS ENGINES AND WATER-POWER MACHINERY.

The element of fuel is a most important subject of consideration for users of machinery in Ceylon. The rapid exhaustion of firewood in many districts through the island is causing its displacement by crude oil, known as "liquid fuel" (the residuum of petroleum after all the lighter oils have been removed), but as manufacturers of this liquid fuel are now finding that it contains valuable by-products, its price has been going up, thus causing much worry to the planters who had begun to depend upon it and to have extensively increased their use of it. In 1913 the quantity of liquid fuel imported into Ceylon amounted to 5,187,700 gallons, exceeding the imports of 1912

by 192,511 gallons. There were also imported into Ceylon in 1913 3,575,797 gallons of bulk oil and 1,117,569 gallons of case oil, this representing a decrease of 710,614 gallons of bulk oil over the preceding year, and an increase of 344,672 gallons of case oil. As this condition respecting fuel appears to suggest the use of suction gas engines, it would seem that there should be an excellent opportunity for American manufacturers in the suction gas plant line of business.

Water-power machinery is extensively used in the hill districts of the island as a motive power for factories, usually not more than 25 horsepower being required for the average plant. It is derived from small streams, which are apt to dry up during certain periods of the year, making other motive power necessary. Water power is not developed here on a large scale from central plants, though there is a possibility of one or two projects of this sort if the difficulty of finding good natural reservoirs for storage of water can be surmounted.

GOVERNMENT PURCHASES THROUGH LONDON—GENERAL MACHINERY.

The Government of Ceylon from time to time arranges through the Crown agent at London for purchases of locomotives, steam rollers, stone breakers, suction dredges, pumps for irrigation, etc. The outlook for woodworking and sawmilling machinery seems promising, as the most accessible forests are becoming so depleted of their timber that it is necessary to erect new plants farther away, especially for cutting firewood. Most of the timbers of Ceylon are very hard. For building purposes large quantities of teak are imported from Burma and white pine from Sweden and Norway.

Among other important articles of metal manufacture imported into Ceylon are galvanized corrugated-iron roofing sheets, mostly in sizes 4 to 10 feet by 24 and 26 gauges, used chiefly for roofing plantation factories, dwellings, "coolie lines," etc. These have to be frequently renewed on account of deterioration due to wet climatic conditions. Large galvanized tanks are used for the storage of water and liquid fuel, about 400 gallons capacity being usual. A great deal of galvanized-iron piping is used for water supplies for estates. There is also more or less demand for artesian-well boring and casing tubes, boiler tubes, and other sorts of tubes and fittings, castings, pumps, and weighing machines. One particular American line which meets with a good sale in the Ceylon market, is the all-wrought-steel split pulley. Many small articles of hardware, such as hammers, axes, saws, nails, etc., are imported from the United States, also a fair amount of wire for fencing, and "shoots," used chiefly to carry down firewood to estate factories by gravity.

DISK PLOWS RECOMMENDED—AGENCIES.

The native farmer of Ceylon makes a limited use of mechanical appliances. The use, however, of American plows for working coconut and rice districts seems to be increasing. A light weight combined with considerable strength seems to be required. On the paddy fields there is frequently the difficulty that a bull can not pull a plow through the mud and water. A light, shallow type of plow must be used for such work and one that does not break the pan surface of the fields, as otherwise the water would escape. The natives as a rule use a light wooden plow for this purpose which is

little more than a mere stick for scratching the mud. The Director of Agriculture of Ceylon strongly recommends disk plows for such work if of a very light and shallow type.

The sale of American machinery in Ceylon is handicapped to a great extent by the long time required or perhaps sometimes unnecessarily consumed in the fulfillment of orders. Unless American types of machinery and hardware reveal certain special advantages in meeting special conditions of the island, British machinery is preferred, because there is so much less delay in shipments. As a rule, American machinery and hardware imported into Ceylon is of a class which can sell with reasonable rapidity, and so can be kept in stock with a minimum of financial burden to the local dealer. If any American article shows a promise of selling readily in the island, it is not difficult to secure agencies for it. In cases where few sales are to be expected it may be possible to arrange for agencies at Madras, where much larger assortments of stock are customarily kept than at Colombo, and then to arrange for some local subagency in Colombo to handle the goods for Ceylon. I would suggest that American manufacturers of, say, four or five different lines combine to open and operate an office in Ceylon, each to pay in proportion to the amount of business secured.

DIRECT SHIPMENTS DESIRABLE—IMPORT DUTIES.

Ceylon is not a part of the Empire of India, as many American manufacturers seem to presume. Although Ceylon may be conveniently worked in connection with the Indian market in some way, yet American machinery and hardware, if supplied from stock in India, must pay the Ceylon duties (unless exempt) in addition to the Indian duties. Thus direct shipments to Ceylon are desirable. The Ceylon duties amount to about \$1 per hundredweight (112 pounds) on brass blocks, bars, wire, tubes, bolts, plates, nails, and tacks. Corrugated iron pays about \$2.27 per ton duty. Iron and steel galvanized goods of all descriptions, including tin tacks, pay about 25 cents per hundredweight duty. Iron and steel (not galvanized), chains, wire, rivets, screws, nails, tacks, washers, bolts, and nuts pay about 21 cents per hundredweight duty, and perforated zinc about \$1 per hundredweight. All other hardware and machinery pay $5\frac{1}{2}$ per cent duty, except that a large class is on the free list, including boilers, locomotives, portable engines, steam rollers, machinery for milling rice, manufacturing tea and rubber, printing presses, sawmills and woodworking machinery, electric motors, coconut desiccators, plumbago-curing machinery, and articles required for iron foundries.

PRINTING PAPER AND MACHINERY.

Inquiry among the various newspaper publishers in Ceylon as to whether or not any American news printing paper or printing machinery is used, shows that practically all the printing paper is imported from England, Sweden, and Austria, and most of the printing machinery from England. Only one publication uses much modern machinery, such as linotypes, etc., most of the work being done by manual labor, which is so cheap as to remove in great measure the incentive for labor-saving machinery.

The Ceylon newspaper publishing establishments do a fair amount of general job printing; a few private establishments, also, make a specialty of this class of work.

CINEMATOGRAPH THEATERS.

[By Consul Charles K. Moser, Colombo.]

Practically the first actual theater in Ceylon is to be constructed at Colombo by the Coliseum Theater Co. The cost is to be approximately \$40,000. The building is to be of brick, iron, and reinforced concrete. It will have orchestra, dress circle, and gallery, seating 1,000. For many years Colombo's only amusement houses have been the public hall, corresponding to the town hall of an American small city, and the tents of itinerary shows. This is the first time that a properly equipped public auditorium with a stage capacity and scenery suitable for legitimate theatrical productions has been attempted. Pending completion of the new hall the holding company has leased the town hall at Maradana for presenting moving-picture shows.

MINING IN CEYLON.

Mining in Ceylon is limited chiefly to two important products, plumbago (graphite) and precious stones. There are spasmodic efforts at mining mica, but the industry has never been brought to success. Private concerns and Government mineralogists have been tireless in searching for gold, but so far it has not been found in sufficient quantities to attract investments. Nearly every precious gem except opals, pearls, diamonds, emeralds, and turquoises is found in the island. It is best known, of course, for rubies, sapphires, garnets, and moonstones and is the only land in the world which produces the latter in commercial quantities.

Gem mining continues to be carried on by primitive hand methods. During 1913 an English and a French company undertook hydraulic mining on an extensive scale in the Ratnapura district, but both failed. Labor conditions and the Singhalese temperament seem to be effective barriers to the use of machinery in gem mining. The supply of good moonstones and some of the more precious stones is becoming scarcer and fine specimens more difficult to procure. The result is that prices for rubies, sapphires, moonstones, peridots, cat's-eyes, aquamarines, and other popular stones of good quality are steadily advancing.

PLUMBAGO.

The plumbago (graphite) deposits of Ceylon are of especial interest to Americans because most of the plumbago used in the United States comes from that island and because the United States has for many years been the largest consumer of the Ceylon material.

The prices paid in New York City by crucible makers and others for Ceylon plumbago during 1913 were approximately as follows:

Plumbago.	Best.	Medium.	Poor.
	Cents per pound.	Cents per pound.	Cents per pound.
Ordinary lump.....	94-11	7½-9	6½-8
Clip.....	7½-10	6½-8½	4-7
Dust.....	4 - 5½	3 - 4	2 - 3
Flying dust.....	2½ - 3½	2 - 3	1½ - 2

The production of the Ceylon mines in 1913 was 570,900 hundred-weight of 112 pounds. It is used chiefly in the manufacture of crucibles for the steel trade. The value of the plumbago is largely determined by the percentage of carbon, while its structure and binding and refractory qualities are also important factors. Ceylon plumbago is known all over the world for its luster, lubricating, polishing, and binding qualities. In appearance it is a strong black crystalline, and in this respect it differs from the grayish lead found in young rock in America. The more refractory the lead the more suitable it is for crucibles.

The total number of working mines, including pits and unimportant pockets, in the five Provinces is 1,335, and they employ 9,553 men. Forty-five of these mines use machinery, principally pumps for removing water from the pits. Recently, however, two important mines in the Kurunegalle district introduced compressed-air drills with some success. The depth of the mines varies from a few fathoms to as much as 120 fathoms. Most of the mines are worked by natives, the only important one controlled by Europeans being the Medapola. At the Medapola mine all the curing, grading, packing, and barreling is done at the mine, but the product of the native mines is shipped to Colombo, where it is mixed with lead to bring it up to a certain standard.

SIMPLE MECHANISMS.

At the majority of the mines the only machinery used is the "dabarc." This consists of a long, wooden barrel with handles at each end. Round this a rope is given two or three turns and a bucket fastened to each end. It is worked by seven or eight men turning the handle. In a few places pumps are used for raising water, and two or three mines have engines for raising dirt, etc. Occasionally small fans are used for ventilating purposes.

The mines generally consist of a vertical shaft 8 or 9 fathoms deep or more, sunk to cut the vein. The workings then go off on the underlay, the vein being opened out its entire length and taken down in one stage. Platforms are fixed at every 10 or 12 fathoms, on which "dabares" are placed for hauling. Means of ascent and descent are made by fixing poles across the vein and forming ladders. Excavating is done by blasting, generally with dynamite.

The vertical shaft is generally sunk through soft ground and requires timber. The timber consists of horizontal planks around the pit, held in place by vertical pieces, which are again held by "mukku" or poles across the ends and middle of pit, these latter being let into the vertical pieces. The whole is made tight by packing pieces and wedges behind the planks.

In the underlay or workings proper, which are generally in rock, no timber is required, but when necessary the supports consist of props fixed into the two walls at the proper angle. Where tunnels require timber, two props are set on the floor, a bar is placed on the top, and planks on these. Props and bars are set at intervals of a few feet, and planks run from one set to another.

SEPARATION AND CURING—GOVERNMENT TAX.

In mining plumbago, it is merely raised from the ground and part of the rock separated. It is then carried in bags by coolies or

bulls to a forwarding shed, where it is packed into barrels and forwarded to Colombo or elsewhere to be cured, that is, separated from stones, mica, or other associates by hand, and classified. The chief classes are "lumps," "chips," "dust," and "flying dust." These are classified again according to quality.

Plumbago is a considerable source of revenue to the Ceylon Government, as there is an export royalty on it of 0.25 rupee per hundredweight (about 8½ cents per 112 pounds). For the benefit of the industry the Government arranges for the inspection of every working plumbago mine once in six months. The miners are advised generally as to their operations, and no mine is allowed to be worked which is considered unsafe. Information is afforded as to the mineralogy of plumbago districts. Skilled plumbago miners work for about 25 cents per day (American money), laborers for about 17 cents a day, and cleaners for about 6 cents per day.

IMPROVED METHODS NECESSARY—EXPORTS.

In the opinion of Colombo shippers mine owners should abandon as far as possible the old methods and old machinery and equip their mines with modern machinery. The most necessary machine is a mine pump that will pump out 2,000 to 3,000 gallons per hour with an engine of 25 to 35 horsepower to run it. One American pump is a type that gives entire satisfaction. It uses 320 feet of 9-inch piping and pumps 2,000 gallons per hour, with an English-made Hornsby-Ackroyd 20-horsepower engine. The supply of plumbago near the surface has been practically exhausted throughout the plumbago district and the mines in going deeper to get more material have naturally encountered more water. Buckets and hand pumps and coolie labor have been unable to cope with the inflow.

Plumbago is the most important mineral export from Ceylon, and more than one-half of the total output is taken by the United States. The following statistics from the Ceylon customs returns show the quantity of plumbago shipped from Ceylon to the principal importing countries in 1912 and 1913 (calendar years):

Countries.	1912	1913	Countries.	1912	1913
United Kingdom.....	<i>Cwt.</i> 107,594	<i>Cwt.</i> 106,954	Japan.....	<i>Cwt.</i> 4,407	<i>Cwt.</i> 2,151
British colonies.....	7,976	6,491	United States.....	310,255	288,218
Belgium.....	57,563	39,367	All other countries.....	1,755	632
France.....	2,214	2,435	Total.....	664,650	570,807
Germany.....	162,886	123,559			

Toward the end of 1913 the plumbago industry, in which Ceylon has long enjoyed almost a monopoly, began to be seriously threatened by the opening up of new plumbago mines in Madagascar. The threat was realized early in 1914, by which time the plumbago market had reached an exceedingly depressed condition. Prices during 1913 were excellent until the last two months, when they began to decline. The average price during the year on the Colombo market was \$5.15 per hundredweight.

PRECIOUS STONES.

[By Consul C. K. Moser, Colombo.]

Ceylon has long been famed for its precious stones, and probably more people in the world to-day know it for its beautiful gems than for any other product. The report following is designed not so much for the trade as for the information of the general public—particularly that portion of the public which includes, or expects in the future to include, Ceylon in its travels. Every year thousands of American tourists come to Ceylon to find small fortunes, or at least to pick up bargains, in precious stones, and many of them fall victims to the wily native merchant, whom they not infrequently consider ignorant of the true value of his gems. It is for the information of such persons that this report is especially intended.

The precious stones found in Ceylon are rubies (i. e., red sapphires); blue, yellow, white, and pink sapphires; asterias, or star stones; alexandrites, beryls, chrysoberyls, cat's-eyes, amethysts, topazes, garnets, moonstones, zircons (jargons and hyacinths), spinels, aquamarines, tourmalines, peridots, and olivines; in short, nearly every gem known to the lapidary except turquoises, diamonds, opals, and emeralds.

No trustworthy statistics are obtainable of the quantity of precious stones exported annually from the island; but the amount is larger than is generally supposed. Local dealers estimate that gems of the value of \$1,000,000 are sent out every year, principally to Hatton Gardens, London, and to Paris; chiefly rubies, sapphires of all shades, and star stones. This, of course, has nothing to do with the vast quantities disposed of to tourists. American jewelers get practically no gems direct from Ceylon, but buy from the European markets.

The local trade is principally with travelers. There are 36 jewelers' shops in the fort of Colombo, not including scores of smaller places, and Kandy has 8 or 10 important stores. All of these are supported almost exclusively by the tourist trade. In former days American tourists were regarded as the most liberal and remunerative patrons, but of recent years German, Dutch, and British travelers have taken their place. Of course, most of the stones and jewelry sold to these tourists are of Ceylon production, but there is a large and increasing trade with them in European-made jewelry (from Germany, France, and England) that is sold as local made. It is regularly introduced here by commercial salesmen from these countries and sold upon order, especially platinum, gold, and silver mounts, amethysts, and other inexpensive stones, and jewelry from Idar. The pearls and other precious or so-called precious stones imported into the colony in 1913 were valued at \$242,536. The value of the jewelry imported was approximately \$216,000, of which \$42,000 worth came from Germany.

FORT JEWELERS RARELY SELL IMITATIONS.

As no diamonds are mined in Ceylon, all diamonds are imported, and this is a poor market for tourists. Opals, however, though not produced in Ceylon, can be bought more cheaply here than in Australia, because the cost of labor for cutting and polishing is so much lower in Ceylon.

It should be especially borne in mind that there is no such thing as a hall-mark in Ceylon, and all jewelry purchased here should be taken for what it is worth. Most of the gold work is made up from the sovereign melted and alloyed with silver and copper. The 2-anna silver piece (nearly the size of a dime), added to a sovereign, makes 18-carat jewelry, the 4-anna piece makes 15-carat, and an 8-anna piece, or half a rupee, added to the sovereign, makes 9-carat gold. Most jewelry made in Galle is of 7 to 9 carats. Silver jewelry is sold by rupee weight, with usually 20 per cent added for the work.

[The celebrated Ceylon pearl fisheries in recent years have been unproductive. For complete details see Daily Consular and Trade Reports for May 15, 1913.]

IMPROVED SANITATION.

The Government authorities of Ceylon appear to recognize at present that proper sanitation is urgently required in this island, and are consequently making important plans for pumping works for drainage purposes and for septic tanks, filters, etc., especially to improve health conditions in and about Colombo. The approximate cost of improvements now planned and to be consummated as rapidly as possible amount to about \$600,000, in addition to about \$1,600,000 which has already been expended in drainage works in Colombo and vicinity. There will also have to be further large expenditures by individual householders and owners of land in making required connections with the main drainage system.

SANITATION INVESTIGATION.

A special sanitary committee was recently appointed to consider the increasing death rate in Ceylon. It has just issued its report, which strongly recommends a permanent sanitary department, which should look after the maintenance and repair of drains, the protection of water supplies, the collection, removal, and disposal of sewage and refuse, and in general take prophylactic measures against disease and also give expert advice on all sanitary matters in the island. It was shown in this report that during the 12 months ended June 30, 1912, 869,369 cases of preventable disease were dealt with in hospitals and dispensaries—an increase of 33 per cent in the number of patients so treated over the year previous, in addition to an enormous number of patients treated in their own homes. During the first quarter of 1912 the death rate, 43.4 per thousand, was the highest on record on the island. At present conditions seem even worse, there having been a severe outbreak of dengue fever in Colombo, due, it is said, to the agency of mosquitoes.

A European medical expert, Dr. P. Bahr, has just paid a visit to Ceylon to investigate on behalf of the Ceylon Government and the Ceylon Planters' Association, the disease known as "sprue," which has been one of the most troublesome complaints on the plantations, and causes heavy mortality amongst the coolies. Dr. Bahr says that this disease has been spread chiefly by house flies.

OPENING FOR AMERICAN METHODS AND APPLIANCES.

In view of the present agitation in Ceylon to improve sanitary conditions, and the liberal expenditures which are to be incurred for

such purpose in the future, not only by the Government but by many private persons who are alarmed by the existing state of affairs, it would appear that the time is opportune for the promotion of American sanitary methods and appliances in this island. At present even in the best hotels and private houses, the toilet arrangements are not such as would be considered satisfactory in the United States. And although mosquitoes, flies, and other insects are the chief causes of disease, yet no attempt so far seems to have been made to keep such pests out of houses by use of wire screens, although the practice is quite general of using mosquito netting around the beds. As soon as rooms are lighted in the evening, such insects usually swarm in, and occasion great discomfort, which for the most part could be easily prevented by wire-screening windows and doors. In the rubber and coconut districts especially, the malaria-producing mosquitoes, which bite chiefly at night, are a great danger to the health of the inhabitants and the prosperity of these districts. As regards the fly pest, little use seems to be made of sticky fly paper and other devices, which are so commonly employed in the United States to limit this nuisance.

It would seem as if American lavatory appliances, wire screening, fly paper, etc., might with a certain amount of judicious advertising, be introduced into the homes of the wealthier European class and on prosperous plantations. Doubtless if a fashion for using such articles once got started here amongst the more well-to-do people, they would eventually be considered necessities which the great majority of white people at least would demand in their houses.

COOPERATIVE CREDIT SOCIETIES.

In view of the great interest now being taken in agricultural cooperative credit societies in Ceylon, I have gathered the latest information as follows, concerning these useful organizations in the island of Ceylon:

Great interest has within the last few months been aroused in Ceylon as to the opportunities and facilities for developing existing industries and the starting of new ones through the assistance of cooperative credit societies. The movement now seems to be taking root, and since 1911 six such societies have become well established, while others are now in process of formation. A legal status and Government patronage of cooperative credit societies was given through the passage in 1911 of an ordinance making definite provision for the constitution and control of such societies, and through the appropriation of \$200,000 from a surplus balance of the colony for lending to deserving societies. Agricultural instructors of the Ceylon Government are taking interest in the cooperative movement by explaining to country people the object of these societies, and the Director of Agriculture, R. N. Lyne, Esq., who is an enthusiastic advocate of the movement, is taking opportunities of addressing large numbers of people on the subject at agricultural shows and various gatherings in the course of his tours in Ceylon.

Rules are now being framed under the ordinance of 1911 to control Government loans to approved societies, to be paid back in installments as may be agreed upon between the Government and the society. A 4 per cent rate of interest is charged, and loans are to be

made only to societies with unlimited liability and for an amount equal to the share capital. Under the ordinance of 1911 the Director of Agriculture holds a position of registrar of cooperative credit societies with a board of control and a secretary. The main business of the societies is to lend seed paddy and manures to members and also money for the purpose of purely agricultural enterprises. These societies are showing an excellent record of good work and have won the confidence of the rural population, the poor peasants being materially benefited by the welcome financial assistance extended to them.

THE MALDIVE ISLANDS.

Information concerning this almost unknown group of islands in the Indian Ocean, near Ceylon, was published in the Times of Ceylon in an interview with a Wesleyan minister, the Rev. P. Middleton Brunwell, of Colombo, who was a privileged guest on a ship specially chartered to go to Male, the capital of the islands, for the purpose of bringing the heir apparent to the Maldivian throne to the Government training school in Ceylon for his education. In his interview Mr. Brunwell states:

There should be remarkable scope for development in the Maldives, as the soil appears to be almost uniformly excellent for the growth of coconuts. I was informed that on one of the islands the annual crop was 200,000 nuts. With a regular monthly steamship service the trade in coconuts might be extensively developed. The ministers and advisers of the Sultan are fully alive to the possibilities of the islands and appear to be most anxious to accomplish their development. In fact the Government is distinctly liberal and very go-ahead, and there is a strong desire to open up trade with the outer world.

At present the principal transactions are done by barter and exchange. The products of the islands are exchanged with the Bombay merchants for rice, curry, foodstuffs, and bazaar produce generally. Money is used to a very small extent only.

I was a little surprised to notice a telephone on Male Island. It connects the customhouse with the Sultan's palace, the post office, and Government buildings. It seemed remarkable that there was an ample supply of fresh water available on Male Island. Apparently a well can be sunk anywhere and fresh water obtained.

The Sultan was extremely courteous and appeared very much interested in news of the outside world. He showed a deep anxiety for the interests of his people and in the progress of the islands. The inhabitants have recently built their ruler a new palace, which, however, looks like an ordinary Ceylon bungalow.

There is practically no crime in the islands—no murder and little theft. There are no prisons, no police. No intoxicating liquor is allowed in the islands and no opium. The only punishment meted out to offenders appears to be deportation to another island. In the Sultan's palace some formidable-looking canes were pointed out to us as being formerly used for corporal punishment, but these are now merely historical curios. There are no taxes, the revenues being obtained from an import duty on the different goods brought into Male by the Bombay traders, and also from a small duty on the produce brought to Male from the other atolls.

The inhabitants of Male appear to be all more or less Government dependents. They have land given them; they live free of rent; they have to build their own houses, but the house material is provided. I noticed when passing through the streets of the pretty town that everything looked extremely clean. On making inquiries, I learned that every householder has to keep that part of the road in front of his house clean, and that where there are no houses the Government employs scavengers to do the work. White sand is strewn in the streets and the result is a remarkably clean appearance.

Though the religion of the islands is Mohammedan, yet women have full liberty and go with their faces uncovered. Moreover, the Mohammedan priests during the day-time are engaged in ordinary work.

INDEX.

Page.	Page.		
Aden, description.....	57	Bombay, Chamber of Commerce.....	68
Advertising, American cameras.....	450	cinematographs.....	168
canned milk.....	374	consular trade review.....	509
cinematograph.....	165	description.....	48
general.....	164	electric-light plants.....	96, 187
value of.....	16	electric street cars.....	81, 83
Afghanistan.....	533	financial review of port	71
Agra, description.....	53	gas lighting.....	187
Agricultural implements, cream separators.....	373	improvement trust.....	61, 65
cottonseed cleaners.....	383	Borax, Tibet.....	569
depots for.....	336	Boring apparatus, wells.....	359
motor and steam plowing.....	349, 451	Bottles.....	280, 274
primitive in Baluchistan.....	478	Bridge, Lower Ganges.....	79
retailing.....	339	Building construction.....	169
rice.....	322	Butter making.....	370
spraying.....	352	Cableway, aerial, Ceylon	624
steam thrashing.....	351	Kashmir.....	464
Ahmedabad electrical works.....	86	Calcutta, Chamber of Commerce.....	68
Allahabad, description.....	53	consular trade review.....	504
Aluminum goods.....	224, 234	description.....	47
Amritsar, carpet manufacture.....	252	electrical supplies	86
description.....	53	electric-light plant.....	96
Andaman Islands.....	489	electric street cars.....	83
Automobiles, Afghanistan.....	536	financial review of port	71
all India.....	191	improvement trust.....	61
Burma.....	199	Candles.....	307
Calcutta.....	203	Canned milk, imports.....	373
Ceylon.....	574	Cardamoms, Ceylon.....	594
Madras.....	197	Carpets, manufacture.....	250
Mysore.....	200, 430	Cashew nuts.....	397
Baluchistan	474	Catalogues, American, for Afghanistan.....	537
fruit trade.....	393	Baroda.....	440
Bananas.....	396	Ceylon.....	610
Bangalore, description.....	54, 433	Delhi.....	177
electric-light plant.....	96	Madras.....	134
Banking.....	22	Cawnpore, Chamber of Commerce.....	69
Barber shops and supplies.....	283	description	51
Bareilly, description.....	54	electric-light plant.....	97
Baroda, city, description.....	54	hide and leather industry.....	293
State of.....	436	tent manufacture.....	245
Barrackpore, electric-light plant.....	96	woolen industry.....	256
Bathrooms, India.....	221	Cauvery Falls electric-light plant.....	97
Bedsteads.....	226	hydroelectric plant.....	101
Ceylon.....	617	Cement, factory	174
Beer, brewed.....	268	market in Madras.....	175
Benares, description.....	53, 468	Ceylon.....	573
electric plant.....	469	Chambers of Commerce, Bombay, Calcutta,	
Bhopal, city, description.....	434	Karachi, Madras, etc.....	67
State of.....	434	Ceylon.....	573
Bikaner, electric-light plant.....	96	Pondicherry.....	486
Bird cages.....	231	Chemicals	286
Boats, folding.....	304	Christmas cards	313
Books, market for.....	41	trade.....	308
preservation.....	145	Chutney, preparation of.....	266
		Cinematographs, advertising.....	165

	Page.		Page.
Cinematographs, Bombay.....	167	Fort William electric-light plant.....	97
Ceylon.....	628	Fruits, fresh, for Ceylon.....	589
Karachi.....	168	Gaslights, high pressure	187
Rangoon.....	168	Glassware, manufacture.....	424
Citrus fruits.....	393	trade.....	299
Coal.....	417, 480	Glue.....	317
Coconut products, Ceylon.....	599	Goa, description.....	487
India.....	390	Gold mining, India.....	414
Coffee, crops.....	330	Tibet.....	569
Colombo, Chamber of Commerce	573	Government administration.....	19
description.....	56, 602	Government stores, purchase, Ceylon.....	611
electric light plant.....	97	India.....	147, 358
electric street cars.....	83	Gwalior, description.....	55, 449
electrical supplies.....	603	maharajah's palace.....	449
Combs.....	306	State of.....	448
Corsets.....	261		
Corundum ore.....	416	Hams and bacon	267
Cotton, crops.....	326	Hardware, Ceylon.....	622
fiber.....	237	India.....	215
fibres.....	189	Hides and skins.....	290
goods, production, exports, etc.....	236	Hosiery.....	263
mills.....	235, 240	Hotels.....	130
seed.....	380	construction.....	173
Credit.....	207	Hyderabad, description.....	55
Credit societies, Ceylon.....	633	electric-light plant.....	97
India.....	36	electric supplies.....	444
Currency, Afghanistan.....	539	electric tramway, proposed.....	448
Ceylon.....	26	mint.....	444
India.....	22	State of.....	442
Cutlery.....	216	Hydroelectric enterprise, Afghanistan.....	544
Dacca, description.....	55	Cauvery Falls.....	431
electric-light plant.....	97	various enterprises.....	102
Darjeeling, description.....	55		
electric-light plant.....	97	Indigo, increased demand	500
Dairy products.....	370	shipments.....	287
Delhi, description.....	52	Iron and steel, pipes and piling.....	212
electric-light plant.....	97, 178	trade, general account.....	205
electric street cars.....	83	Irrigation works, Gwalior.....	452
new capital.....	176	system in India.....	354
Diseases.....	59	Ivory.....	426
Drugs, Afghanistan.....	558	Jadeite	417
Ceylon.....	615	Jaipur, description.....	54
India.....	280	Jute, crops.....	318
Education, general.....	40	Kabul, description	542
industrial, Afghanistan.....	545	Kandy, description.....	56
India.....	433, 438, 454	electric-light plant.....	97
Egret farming.....	428	Kapurthala, city	473
Electrical plants and supplies, Afghanistan.....	544	State of.....	473
Hyderabad.....	444	Karachi, Chamber of Commerce	69
India.....	85	cinematographs.....	168
Electrification, cotton mills.....	239	consular trade review.....	529
Electric street cars.....	81	description.....	50
Elephants.....	426	electrical enterprise.....	86, 188
Elevators, electrical, Bombay.....	95	financial review of port.....	71
Enamelled ware.....	215, 224	Kashmir, electric-light plant.....	98
Engines, gas, Ceylon.....	625	State of.....	455
oil.....	368	Khargpur, electric-light plant.....	98
Essences and syrups.....	274	Khyber Pass.....	541, 542
Explosives.....	305	picture of.....	Facing 542
Fertilizer, lime nitrogen factories	103	Knit goods.....	253
Fire-fighting apparatus.....	189	Kolar gold field, electric-light plant.....	96
Fisheries.....	409	fire-fighting apparatus.....	189
Foreign trade statistics.....	104	operation of mines.....	413
Forestry.....	399	Lac, culture and exports	404
		Lahore, description.....	52

Page.	Page.		
Lamps, Ceylon.....	614	Papain, Ceylon.....	595
metal.....	225	Paper goods, watermarks.....	140
Language.....	34	Parcel post, value payable.....	154
Languages, on trade-mark.....	143	with United States.....	152
Lashkar, electric-light plant.....	98	Patents.....	144
Laundries.....	276, 280	Fatna, description.....	55
Leather goods.....	290	Peanuts, India.....	334
manufactures.....	294	Portuguese India.....	484
Lemons.....	393	Pearl fisheries, Bahrein Islands.....	412
Letters, form of address.....	158	Ceylon.....	632
Liquors.....	208	Pencils and pens.....	312
London, medium for American trade.....	101	Petroleum, industry.....	420
Lucknow, description.....	53	Phonographs.....	298
electric-light plant.....	98	Pianos, Ceylon.....	615
Machinery, Ceylon	622	India.....	298
India.....	209	Playing cards, Ceylon.....	590
preservation.....	146	Plumbago, Ceylon.....	628
Madras, Chamber of Commerce	69	Plumbing.....	222
consular trade review.....	514	Pondicherry, description of.....	483
description.....	49	Poona, description.....	54
electric-light plant.....	98	Population.....	20, 32
electric street cars.....	14	Post office, Afghanistan.....	538
Madura, description.....	54	business with United States.....	152
Mahua tree.....	406	lighter mails.....	503
Maldive Islands.....	634	traffic.....	153
Mandalay, description.....	56	value-payable system.....	153
electric street cars.....	53	Precious stones, Ceylon.....	631
Manganese.....	415	India.....	417
Mangoes, canning.....	396	Price lists.....	163
Matches.....	305	Printing supplies.....	314, 627
Maulmehn, description.....	56	Pumps, chain.....	361
Merchandise, marks, Afghanistan.....	55	operation.....	363
India.....	138, 160	Pure-food goods.....	266
preservation.....	145	Quetta, description of.....	475
Meteorology, monsoon.....	265	Races	33
Mica.....	415	Radium.....	416
Millet and pulse, crops.....	332	Railways.....	73
Mineral waters.....	270	Rampur City, electric-light plant.....	98
Mines, Ceylon.....	628	Rangoon, Chamber of Commerce.....	69
India.....	413	cinematographs.....	168
Mint, Hyderabad.....	444	consular trade review.....	520
Mirrors, road.....	184	description.....	55
Motor vehicles, automobiles.....	191	electric-light plant.....	99
fire engines.....	190	electric street cars.....	84
Music, American sheet.....	430	financial review of port.....	72
Musical instruments, Ceylon.....	615	Religion.....	33
India.....	297	Rice, crops.....	320
Mysore, electric-light plant.....	98	milling.....	321
State of.....	430	Roofing, American.....	170
Newspapers, for advertising	164	Rubber, crops and exports, Ceylon.....	596
trade papers for Mysore.....	432	India.....	333
Oils, American cottonseed.....	384	Rubies.....	417
fuel, Ceylon.....	588	Safes	225
India.....	368	Salmon, American, sale of.....	409
ghee.....	386	Salvation Army, silk industry.....	248
vegetable.....	376	Sandalwood	402
Oils and drugs, preservation.....	146	Sanitation, Ceylon.....	632
Oilseeds, crops.....	330	India.....	58
Opium, crops and exports.....	333	Sapphires.....	417
Optical goods.....	311	Sardine oil and guano.....	411
Oranges.....	393	Sewing machines.....	211
Packing, apples for Ceylon.....	589	Sheep, Afghanistan.....	555
automobiles.....	198	Shirts and collars.....	259
goods in general.....	145, 163	Shoes, Afghanistan.....	551

	Page.		Page.
Shoes, Ceylon.....	617	Telephones, Afghanistan.....	547
India.....	295	automatic, Simla.....	587
Shocks.....	408	Tents and camp furniture.....	244
Silk industry, Benares.....	472	Textile manufactures.....	235
Burma.....	249	Tibet.....	561
Kashmir.....	459	Timber-felling machines.....	407
Salvation Army.....	248	Tobacco, cigars.....	229
Silverware.....	232	crops.....	828
Simla, description.....	51	Toilet articles, Ceylon.....	616
electrical plant.....	92, 99	India.....	276
electrical supplies.....	89	Toys.....	301, 310
Sleepers, American, for railway.....	407	Trade-marks, legislation.....	188
Snake bite, antidote.....	288	pictorial.....	142
Soaps.....	276	Travelers, commercial.....	120
Sporting goods.....	301	Trucks, tip.....	84, 358
Sprinklers, automatic.....	189	Tungsten.....	416
Srinagar, description.....	55, 458	Turpentine and rosin.....	408
electric-light plant.....	99	Typewriters, Ceylon.....	614
Stationery trade.....	312	India.....	315
Steamship routes.....	126	Umbrellas	263
Steel and iron, firms selling to Government.....	150	Underwear	260
metallic gates and sashes.....	173	Wages, cotton-mill	238
preservation.....	146	War, effect on trade.....	490
Stoves, drying.....	230	Water-power projects.....	100
gas cooking.....	229	Waterproof clothing.....	264
Streets, improvements.....	182	Wax cloth, Afridi.....	253
Sugar crops	324	Weights and measures.....	26
Tanning materials	293	Wheat crops	319
Tariff duties, Afghanistan.....	554	Windmills.....	366
Ceylon, general.....	137	Wool, Afghanistan.....	555
motor vehicles.....	581	Tibet.....	568
Gwalior.....	453	trade.....	265
India.....	135	Woolen goods.....	264
Kashmir.....	463	Woolen manufacture, Afghanistan.....	545
Taxicabs	192, 199	Kashmir	459
Tea, culture, Ceylon.....	590	Zinc	220
crops, India.....	329		
Teak, Burma exports.....	400		



